Manitoba

Annual Report 1989 - 90

Energy and Mines

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Manitoba

Annual Report 1989 - 90

Energy and Mines

91-05365/

Minister of
Energy and Mines

Room 301
Legislative Building
Winnipeg, Manitoba, CANADA
R3C 0V8

The Honourable George Johnson
Lieutenant-Governor of the Province of Manitoba

May It Please Your Honour:

I have the honour of presenting to you the Annual Report of the Department of Energy and Mines for the fiscal year ending March 31, 1990.

This report records the activities of the Department and the performance of the mineral resources and energy sectors of the province during the year.

Respectfully,

Harold Neufeld
Minister

Manitoba

Deputy Minister of
Energy and Mines

Room 309
Legislative Building
Winnipeg, Manitoba, CANADA
R3C 0V8

(204) 945-3130

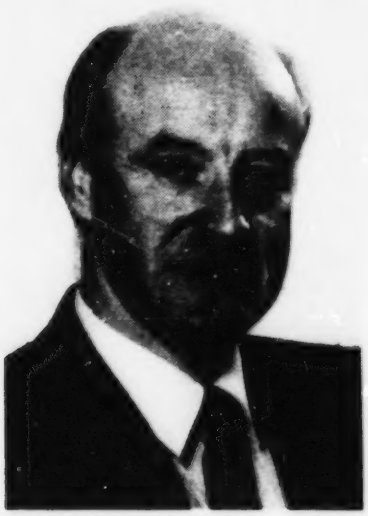
The Honourable Harold Neufeld
Minister of Energy and Mines

Dear Sir:

I have the honour to present the Annual Report of the Department of Energy and Mines for the fiscal year ending March 31, 1990. The report contains a descriptive and statistical record of activities and achievements in the mineral and energy sectors during the year.

Respectfully submitted,

Ian Haugh
Deputy Minister



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Department of Energy and Mines

Introduction

Serving Manitoba

The Department of Energy and Mines has an important job. In a province endowed with substantial mineral and hydro electric resources, the department's job is to encourage and facilitate the development of those energy and mineral resources.

The department has two main tasks, both of equal importance.

First, we are promoters of Manitoba's energy and mineral resources. We support the industries who use our resources and contribute to our economy. These contributions are substantial. More than 17,000 people were employed in the mining, petroleum, and energy sectors. Over the last five years the total value of mineral production in Manitoba has averaged $1.2 billion per year. In 1989 Manitoba produced 722 800 cubic metres of crude oil valued at $90 million. Electricity revenues in Manitoba were $678 million in 1989. Clearly the mining, petroleum, and energy sectors are major contributors to Manitoba's economic well-being. The department provides information and services to these industries.

The department's second task is equally important. We are guardians of Manitoba's resources and regulators of the ways our resources are used. The department oversees the orderly and environmentally sound development of our energy and mineral resources. We promote the conservation and wise use of our resources. We can report success in these areas. Manitoba's energy demand declined by 1.5 per cent between 1978 and 1988 despite population growth of 5 per cent and a real domestic product growth of 32 per cent.

In both of its roles the Department of Energy and Mines serves the people of Manitoba. Manitobans benefit economically from dynamic energy and mineral industries; they also benefit from the wise stewardship of our resources.

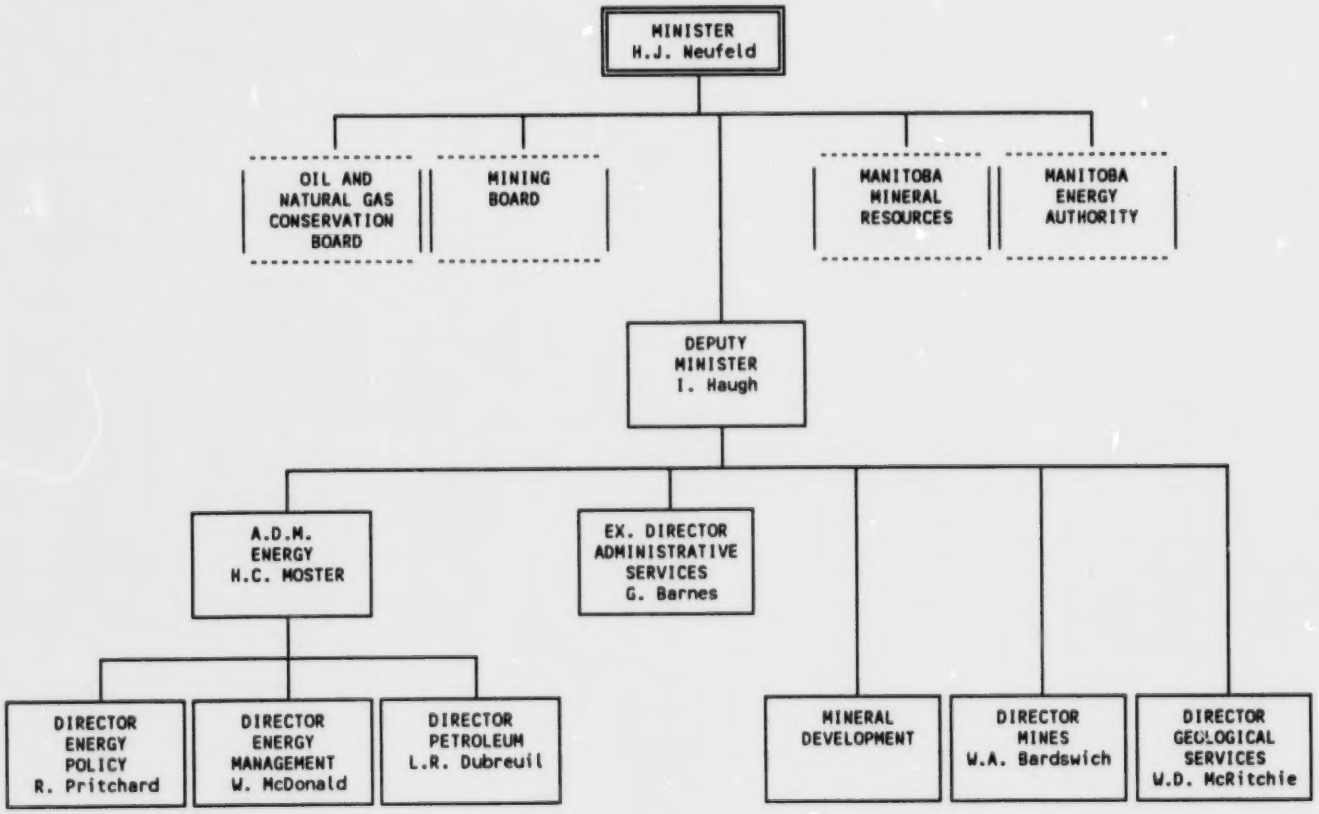
A New Structure for the Annual Report

We have made a number of changes in the format and contents of the department's Annual Report. These improvements will give you a clearer and more complete picture of the operations and achievements of the department.

- The Annual Report begins with an overview of the department and a list of acts, Crown corporations, and boards for which the Minister of Energy and Mines is responsible. You will also find a note on which statutes have been added or deleted during 1989/90.
- The Annual Report continues with a report from each of the department's divisions on its duties and activities during 1989/90. The Annual Report now describes the divisions in the same order as they are listed in the Estimates - Administration and Finance, Energy and Minerals (but excluding the Manitoba Energy Authority, which produces its own annual report). This will make it easier for you to use the two documents together to get a complete picture of the department's performance.
- Another feature of this year's report is the inclusion of expenditure information for each sub-appropriation after the narrative for each branch.
- A separate Financial Information section clearly summarizes for you both expenditures and revenues for 1989/90.
- The Historical Information section now includes a table of expenditures and staffing for the last five years. This will allow comparisons to be made quickly and easily.
- In the Statistical Information section you will find a new Departmental Directory that conveniently lists department positions and telephone numbers. The section includes statistical supplements and a listing of departmental publications.

Organization Chart - Manitoba Energy and Mines

MANITOBA ENERGY AND MINES DEPARTMENTAL OVERVIEW



Statutory Responsibilities

The Minister of Energy and Mines is responsible for the following statutes.

The Manitoba Energy Authority Act
The Manitoba Energy Council Act
The Gas Pipe Line Act
The Gas Storage and Allocation Act
The Greater Winnipeg Gas Distribution Act (SM 1988, c. 40)
The Homeowners Tax and Insulation Assistance Act (Part V and Section 1 and Part VI as they relate to subjects covered under Part V)
The Industrial Minerals Drilling Act
The Mineral Exploration Assistance Act
The Mines Act
The Mining and Metallurgy Compensation Act
The Natural Gas Supply Act
The Manitoba Natural Resources Development Act (as it applies to Manitoba Mineral Resources Ltd.)
The Oil and Gas Production Tax Act
The Pipe Line Act

The Manitoba Energy Foundation Act was repealed during the 1989/90 Session of the Legislature.

The Minister of Energy and Mines, in addition to his responsibility for the department, also holds responsibility for the following Crown corporations and boards.

Manitoba Hydro
Manitoba Mineral Resources Ltd.
The Mining Board
The Oil and Natural Gas Conservation Board
Manitoba Energy Authority

Manitoba Hydro, Manitoba Mineral Resources Ltd., and the Manitoba Energy Authority produce their own annual reports.

Administration and Finance

Administration and Finance comprises the Executive Support Branch and the Administrative Services Division.

A limited restructuring of this division took effect on September 1, 1989. As a result, the Communications and Community Relations Division was dissolved and other divisions took over its functions. Information management is now integrated with other management functions.

The following summarizes the reallocation of resources from the former Communications and Community Relations Division:

Appropriation No. 23-1C	SY'S 1989/90 Est.	Salaries 1988/89 Actual	Salaries 1989/90 Estimated	Other 1988/89 Actual	Other 1989/90 Estimated
Reallocated to:					
Executive Support	1.00	48,600	54,200	11,600	14,800
Administrative Services	2.26	62,400	66,700	17,000	21,600
Energy Management	4.00	132,200	146,400	53,500	68,000
Mines	3.00	111,100	105,700	55,800	71,000
TOTAL	10.26	354,300	373,000	137,900	175,400

Executive Support Branch

Executive Support includes the Offices of the Minister and Deputy Minister of Energy and Mines. This branch provides for the overall planning and policy direction of the department, co-ordinates departmental activities, and advises the Minister on energy and minerals matters.

Expenditures by Sub-Appropriation

23-1A & 1B Executive Support	Actual 1989/90 $	Estimate 1989/90 SY	Estimate 1989/90 $	Variance Over(Under)	Expl. No.
Total Salaries	397,000	9.00	410,300	(13,300)	
Total Other Expenditures	140,300		98,100	42,200	1.
Total Expenditures	537,300	9.00	508,400	28,900	2.

Explanation Number:

1. Increased costs associated with Lynn Lake mine closure ($9,200); Hudson Bay Mining and Smelting ($17,500); and General Operating costs ($15,500).
2. Includes 1.0 SY ($48,600 Actual; $54,200 Estimate) and Operating ($11,600 Actual; $14,800 Estimate) related to Communications and Community Relations reorganization.

ADMINISTRATIVE SERVICES DIVISION

Administrative Services provides a comprehensive range of services in support of the entire department. The support services include financial and accounting services, personnel management, computer systems support, library services, and administrative policy development. By providing these specialized services the Administrative Services Division helps the other divisions in the department to fulfil their program goals.

Financial Services

The Financial Services Section provides a broad range of financial, accounting, budgetary, and operational support services to the department. Principal among these are:

- financial planning and co-ordination of the departmental annual revenue and expenditure estimates;
- financial advice to program managers;
- financial reporting and expenditure control;
- voucher processing and disbursement;
- revenue accounting;
- co-ordination of requests for departmental goods and services including office accommodation and equipment; and
- co-ordination of departmental vehicle usage and maintenance and administration of the parking program.

In 1989/90 our staff processed 4,868 payment vouchers.

The section now provides operational support services to the department. During the 1989/90 fiscal year a new program was introduced; staff implemented the new paid parking program.

In addition to its ongoing responsibilities, the section established an internal audit system for the department. Staff also continued to assist in the review of the Mining Recording System.

The Financial Services Section is committed to the departmental goal of providing even better service. This section will pursue that goal through the improved quality of the service offered to branches in the department. In addition we will pursue the following three initiatives in 1990/91. We will continue to play an advisory role in the review of the Mining Recording System. Secondly, we will work with Government Services to identify space requirements for branches that are moving under the decentralization program. Finally, we will develop an emergency response plan that will enable the department to act quickly as emergencies arise.

Personnel Services

The Personnel Services Section provides human resource management services to the department, including:

- position classification;
- recruitment and selection;
- employee relations;
- training and development;
- payroll and benefits administration;
- affirmative action co-ordination; and
- French Language Services co-ordination.

In 1989/90, our staff filled 39 positions excluding casual and summer student positions. Staff also completed formal classification reviews on 26 positions. We actively participated in this year's departmental reorganization. The Personnel Services Section played a key role in the implementation of the department's decentralization initiatives; we co-ordinated all classification, staffing, relocation, and redeployment activities.

The section continued the application of Affirmative Action policies. This year we provided training and work experience in accounting, records management and computer-related fields to five native students. Overall, the department was successful in increasing the number of employees from the physically disabled target group and in maintaining representation from the female and native target groups.

Staff will continue to be busy with departmental reorganization and decentralization into the 1990/91 fiscal year. In addition, we will undertake a review of all internal personnel procedures, systems and reporting mechanisms. The section will also participate in a training and certification program; the department itself will then be able to classify positions rather than going to the Civil Service Commission.

Computer Services

The Computer Services Section provides the department with data processing and word processing support services, including:

- equipment evaluation and acquisition;
- user education and assistance;
- computer systems design and implementation;
- liaison between the department and other government agencies; and
- maintenance of the main word processing equipment.

The section is currently developing the Geological Stores System for the Geological Services Branch.

We have scheduled four system additions for 1990/91: the Mining Recording Work Commitment System; the development of an accounting system for the Mines Branch; completion of the Geological Stores System and the development of a pilot Geographic Information System for the Geological Services Branch.

Library Services

The department's library is a resource centre for staff members. Our responsibilities include the acquisition, storage, and retrieval of reference materials. We provide research and reference services to staff who use the library.

In 1989/90 the library made 616 loans as well as 211 interlibrary loans. The library added 3,653 books, reports, maps, and periodicals to its collection.

Expenditures by Sub-Appropriation

23-1D Administrative Services	Actual 1989/90 $	Estimate 1989/90 SY	Estimate 1989/90 $	Variance Over(Under)	Expl. No.
Total Salaries	579,300	17.26	585,100	(5,800)	
Total Other Expenditures	95,500		108,400	(12,900)	
Total Expenditures	674,900	17.26	693,500	(18,700)	1.

Explanation Number:

1. Includes 2.26 SY's ($62,400 Actual; $66,700 Estimate) and Operating ($17,000 Actual; $21,600 Estimate) as a result of Communications and Community Relations reorganization.

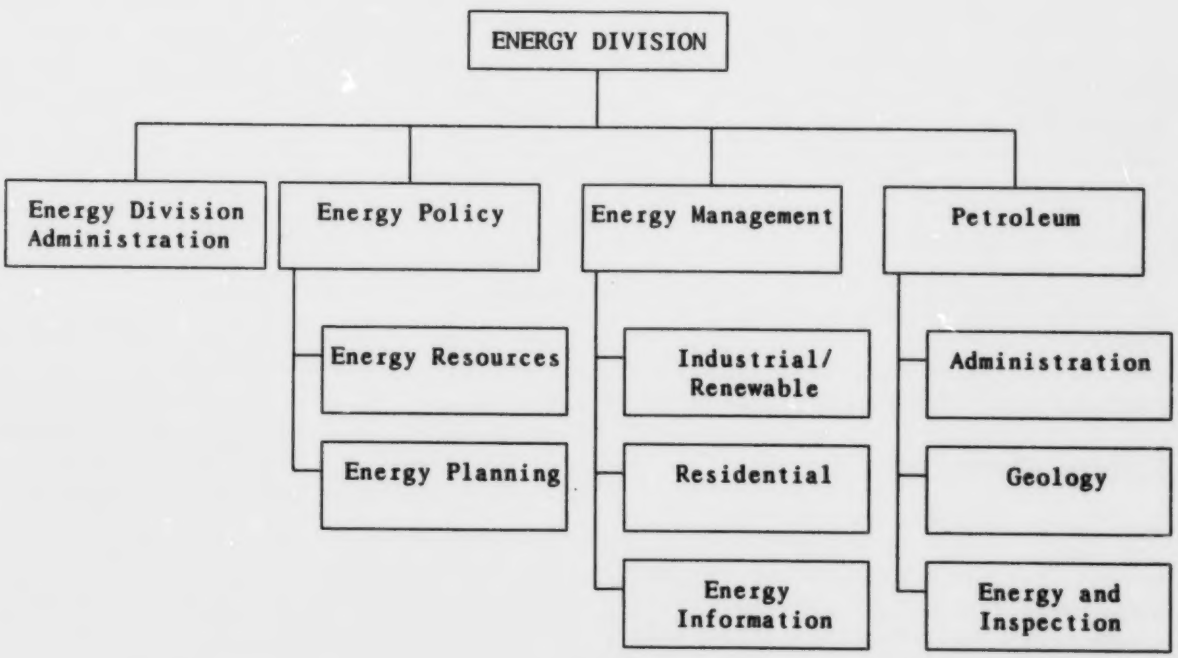
ENERGY DIVISION

The Energy Division has two clear goals. Our first goal is to ensure that a secure supply of energy is available to Manitobans at reasonable cost. Secondly, we strive to improve energy conservation and end-use efficiency. To achieve these goals the Energy Division develops, implements, and administers strategic plans and programs.

- The Energy Division promotes energy efficiency. We offer a wide range of energy conservation programs to businesses, institutions, and individuals. Our programs include on-site energy audits that identify possible energy savings.
- We encourage the development of the province's crude oil and natural gas resources. We oversee the exploration, development, production, and transportation of crude oil and natural gas.
- The division undertakes research and provides policy advice on energy issues for the departmental executive.
- The Energy Division develops and implements energy related programs in accordance with government policy.
- We also assess the impact of energy-related legislation and programs on energy supply and conservation.

Energy Division Organization

The Energy Division is administered by the Assistant Deputy Minister of the Energy Division. The division is made up of three branches: Energy Policy, Energy Management, and Petroleum. Each branch is managed by a director who reports to the Assistant Deputy Minister.



Energy Division Administration

An Assistant Deputy Minister gives overall direction for programs related to the development and management of energy resources. This person reviews and develops energy policy and legislation and undertakes planning and evaluation of new programs.

Expenditures by Sub-Appropriation

23-2A Energy Administration	Actual 1989/90 $	Estimate 1989/90 SY	Estimate 1989/90 $	Variance Over(Under)	Expl. No.
Total Salaries	93,100	2.00	90,800	2,300	
Total Other Expenditures	9,600		10,000	(400)	
Total Expenditures	102,700	2.00	100,800	1,900	

Energy Policy Branch

The Energy Policy Branch is the research and planning section of the Energy Division. The section collects and analyzes information that is relevant to Manitoba's energy requirements. We examine data regarding energy supply and use. Part of our job is to assess the impact of international and national energy developments on Manitoba. Using our research and data collection the Energy Policy Branch suggests strategies for addressing energy issues and helps to plan and evaluate energy programs. It is these strategies and programs that help us to achieve our goals of a secure energy supply and improved energy conservation.

The Energy Policy Branch is organized into an Energy Resources Section and an Energy Planning Section. The managers of the two sections report to the director of the Energy Policy Branch.

Energy Resources Section

The Energy Resources Section focuses on energy supply issues and trends that may affect Manitoba and defines strategies that will address these issues. The section monitors and analyzes various supply and demand factors that have a bearing on energy pricing trends. We evaluate long term alternatives to our current energy supply. As part of our planning function the section maintains interdepartmental and extraprovincial liaisons. We also monitor energy matters that come before various regulatory bodies.

Regulatory Proceedings - During 1989/90 the section reported on a series of natural gas and electricity hearings conducted by the Manitoba Public Utilities Board. These hearings examined rate applications, gas utility integration and rate structures, ownership change, and gas purchase contracts. Similarly, the section closely monitored National Energy Board hearings relating to natural gas pipeline system expansion, tolling issues, natural gas export approvals, and pipeline access questions. Monitoring of regulatory proceedings remains a high priority of the section as the Canada-US Free Trade Agreement continues to effect change in the domestic energy market.

The Energy Resources Section undertook a wide ranging program of activities during 1989/90 including:

- monitoring and providing advice to senior management on natural gas and electricity matters before the Public Utilities Board;
- development of a draft policy paper on natural gas for Manitoba;
- participating in the development of an Energy Division strategic plan;
- preparing a report on energy supply and demand in the province of Manitoba;

- undertaking a review of provincial petroleum royalties, taxes, and incentive schemes;
- undertaking a review of petroleum exploration in environmentally sensitive areas of Manitoba;
- preparing the 1988 Oil Activity Review.

Energy Planning Section

The Energy Planning Section studies how we use energy (energy end-use) in Manitoba and how Manitoba can achieve a secure energy supply. Our responsibilities include providing analytical support for the design, delivery, and evaluation of programs and analyzing energy consumption and expenditure patterns in Manitoba. Our research provides information like that shown in Figure 1. The Energy Planning Section also monitors energy planning and programming in other jurisdictions and participates in strategic assessments of energy issues.

During 1989/90 work continued on energy end-use analysis and forecasting. The section began program reviews and evaluations to assist in developing new energy conservation and efficiency initiatives. The section also began a major project with the Sustainable Development Coordinating Unit on a sustainable development strategy for energy.

Activities and accomplishments of the Energy Planning Section during 1989/90 included:

- enhancing the division's residential end-use database (at year-end it contained building shell, equipment, and appliance data for over 3,500 Manitoba homes);
- using the database we estimated how electricity was being used in homes (e.g. space heating, refrigeration, etc.);
- building a computer model for residential energy end-use forecasting;
- producing a preliminary residential electricity demand forecast for the province;
- acquiring residential natural gas consumption data that will assist in analysis, estimation, and forecasting of residential natural gas consumption;
- enhancing the division's commercial end-use database (at year-end it contained building shell, equipment, time-of-use and energy consumption data for over 700 Manitoba commercial and institutional buildings);
- expanding and improving the database on the commercial/institutional sector;
- researching opportunities for improving energy end-use efficiencies;
- evaluating energy programs and proposed initiatives and assisting in strategic planning;
- developing an energy substrategy as part of the province's sustainable development initiative; and
- participating in federal/provincial planning for energy emergencies.

In the fiscal year 1990/91, the section will continue its energy end-use analysis for forecasting and planning purposes, hold public workshops on a sustainable development energy strategy, and assist in developing division energy plans.

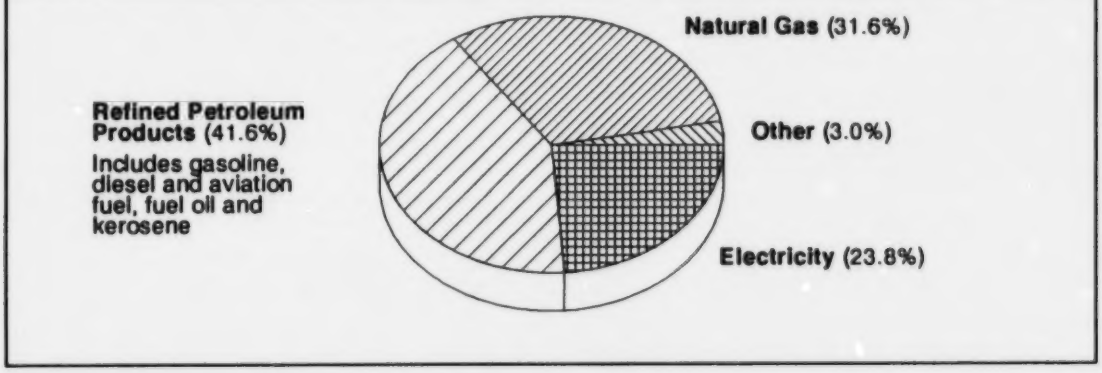
Expenditures by Sub-Appropriation

23-2B Energy Policy	Actual 1989/90 $	SY	Estimate 1989/90 $	Variance Over(Under)	Expl. No.
Total Salaries	385,700	8.00	377,400	8,300	
Total Other Expenditures	54,500		67,200	(12,700)	
Total Expenditures	440,200	8.00	444,600	(4,400)	

Figure 1

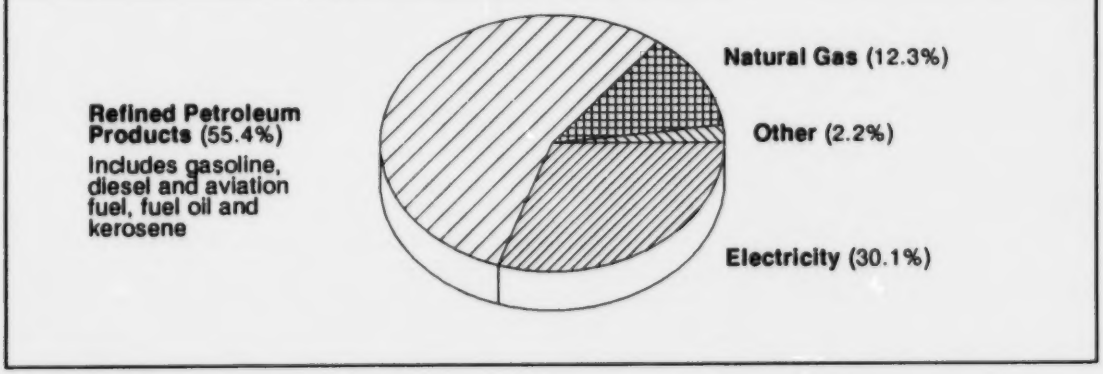
Manitoba Energy Consumption - 1989

by fuel type (224 733 Terajoules)


Natural Gas (31.6%)
Other (3.0%)
Electricity (23.8%)
Refined Petroleum Products (41.6%)
Includes gasoline, diesel and aviation fuel, fuel oil and kerosene

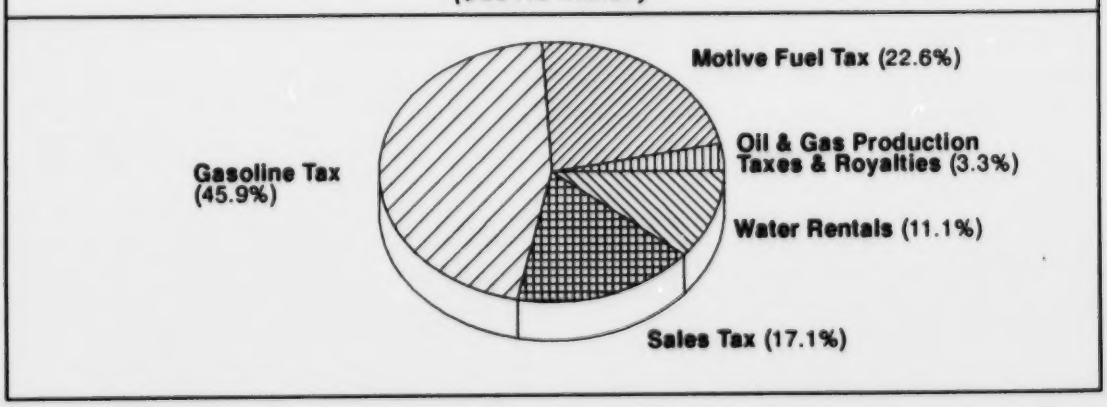
Retail Value of Manitoba Energy Consumption - 1989

($2.105 billion)


Natural Gas (12.3%)
Other (2.2%)
Electricity (30.1%)
Refined Petroleum Products (55.4%)
Includes gasoline, diesel and aviation fuel, fuel oil and kerosene

Provincial Government Revenues from Energy Consumption and Production - 1989/1990

($281.2 million)



Energy Management Branch

The Energy Management Branch is responsible for the promotion of energy conservation, use of energy efficient technologies, and substitution of renewable and alternative energy sources. Activities of the branch are directed towards:

- reducing energy consumption throughout Manitoba in a cost-effective manner;
- developing public awareness of energy conservation;
- encouraging the application of proven energy conservation technologies; and
- encouraging renewable and alternative energy forms.

During fiscal 1989/90, the branch comprised three sections: the Industrial/ Renewable Section, the Residential Section, and the Energy Information Centre. The managers of these sections report to the director of the Energy Management Branch.

Industrial/Renewable Section

The Industrial/Renewable Section encourages efficient energy use in the non-residential sectors of the Manitoba economy and encourages the substitution and use of renewable energy sources.

Manitoba Energy Audit Program

This program promotes efficient energy use in industrial, commercial, institutional, and agricultural facilities. Facility management staff and administration are shown how to improve energy efficiency and reduce costs. Initiated in 1980, the program has completed over 1,700 energy audits of Manitoba industries, businesses, institutions, and community-based organizations. As of March 31, 1990, approximately $11.6 million in potential annual energy savings had been identified by program audits.

The program currently operates two computer-equipped audit vehicles (the Energy Buses) that are capable of providing complete on-site service. Program engineers and technologists inspect the facility's operation, analyze its current energy use, identify areas of potential savings, and present results to the client. The client can then use this information to undertake cost-effective energy saving projects.

A total of 180 audits were targeted for the 1989/90 fiscal year. The actual number of facilities audited totalled 182, with more than $1.67 million in potential annual energy savings identified.

In fiscal 1990/91, the program will be redirected to provide greater focus on undertaking work in the public sector. The government wishes to demonstrate a leadership role in "getting its own house in order" and as a result will be undertaking more audits of schools, health care facilities, municipal buildings, and other government facilities.

As well, additional technical assistance will be provided to audit clients to assist them to increase the number of energy saving retrofit measures undertaken and obtain better data on the actual savings generated by the program. This will result in a reduction of audits being undertaken, but will result in greater energy savings per audit. It is estimated that 125 audits will be undertaken in 1990/91, with this number increasing to 150 in 1991/92.

The Energy Manager

The Energy Manager newsletters use case studies of Energy Bus clients to promote the opportunities and benefits of energy efficiency to similar businesses or institutions. The Energy Manager is consistently well received by its target audiences, and offers an excellent, low-cost way to promote energy management.

The Energy Manager is published periodically, as useful case studies arise. One issue was produced in fiscal 1989/90 on energy savings achievable in health care facilities. To date, five issues have been published and 8,000 copies have been distributed.

Health Engineering Maintenance Association (HEMA)

Audit staff made a half day presentation on energy management to over 100 attendees at the Health Facilities Maintenance Seminar presented by the Health Care Engineering Maintenance Association.

Demonstration Projects

The Energy Management Branch supports a variety of projects that either demonstrate or promote effective energy management techniques.

In fiscal 1989/90, the branch provided management assistance and a financial contribution for the following three energy management and renewable energy demonstration projects (amounts listed in brackets represent provincial funding level for 1989/90).

1. Pro-Trucker Program ($20,000)

   This program administered by the Manitoba Trucking Association, assists the trucking industry, including fleet owners, owner/operators and drivers, to reduce fuel consumption and costs. The program is co-funded by Energy, Mines and Resources Canada, which provided $75,000 in 1989/90. In addition, the province of Ontario and various members of the trucking industry financed individual activities.

2. Ground Source Heat Pump Monitoring Project ($3,879)

   The Industrial Technology Centre and Manitoba Research Council are conducting a three year, $165,000 project to monitor the actual performance of large-scale ground source heat pumps in industrial, commercial, and institutional buildings in Manitoba. The study is sponsored by Manitoba Energy and Mines ($25,000 total funding), Energy, Mines and Resources Canada ($50,000 total), Manitoba Hydro ($40,000 total), and the Canadian Electrical Association ($50,000 total).

3. Monitoring of Residential Gas Furnaces and Boilers ($4,500)

   UNIES Consulting Engineers of Winnipeg expanded on a previous study of the levels of savings actually achieved when older gas-fired furnaces and boilers are replaced with new units rated at equal or higher efficiencies.

   Energy, Mines and Resources Canada co-funded this project, providing $15,000 in 1988/89. A total of $15,000 was provided by Manitoba in 1988/89 and 1989/90.

Residential Section

The Residential Section promotes increased home energy efficiency. In addition to the direct benefit of energy conservation, the program provides benefits in the way of employment opportunities in the province's construction industry and an improved housing stock.

Home CHEC-UP

The Home CHEC-UP Program helps homeowners conserve energy by providing impartial advice on home retrofits. A trained Energy Advisor conducts an energy analysis of the home and provides the homeowner with a report outlining, in detail, the recommended retrofit techniques.

There is no charge to the homeowner for a Home CHEC-UP. The program is administered by Energy and Mines, and delivered by Manitoba Hydro. Since program inception in 1984, over 23,600 homes have had a Home CHEC-UP.

The goal for fiscal year 1989/90 was 4,500 audits. Actual results were 4,194 completed audits. This lower number was due to the fact that the program operated with only 75 per cent of the staff complement for the majority of the year.

Cut Home Energy Costs (CHEC) Loan Program

The last full year for the CHEC loan program was 1989/90. During the year a total of 3,390 loans valued at $3.96 million were made to homeowners wishing to retrofit their homes.

Home Energy Savers Workshops

The Home Energy Savers Workshops, delivered throughout the province, are designed to educate homeowners on the proper techniques in retrofitting their homes effectively. During fiscal year 1989/90, 32 workshops were delivered to a total of 467 participants. Forty workshops are planned for fiscal year 1990/91. Since program inception, 118 workshops have been delivered to 1,969 homeowners.

Home Retrofit Booklet Series

The How-to Retrofit booklets provide homeowners with technical information on proper retrofit techniques. The booklets offer a detailed guide for contractors and do-it-yourself clients. Since their launch in mid-1986, more than 190,000 booklets have been distributed, of which more than 80,000 were distributed in 1989/90. Five of the seven booklets in the series have been published. Booklet number six covering heating and ventilation, and booklet number seven on lighting and appliances will be released in 1990/91.

Retailer Training Seminars

To complement the Home Retrofit Booklet Series, the department has developed training seminars on energy conservation techniques for building supply personnel. A reference manual on retrofit techniques has been developed and printed, and will be used as a training tool during the workshops. Twenty-four training seminars are planned for fiscal year 1990/91.

Energy Information Centre

The Energy Information Centre disseminates information in printed and audio-visual form on energy management in the residential, commercial, industrial, and institutional sectors. It provides information on Manitoba's energy resources including hydro and petroleum resources and answers inquiries concerning the department's energy management programs.

In fiscal 1989/90, the section responded to 15,901 energy-related inquiries.

Expenditures by Sub-Appropriation

23-2C Energy Management	Actual 1989/90 $	Estimate 1989/90 SY	Estimate 1989/90 $	Variance Over(Under)	Expl. No.
Total Salaries	675,000	18.00	712,100	(37,100)	
- Grants/Transfer Payments	847,500		840,800	6,700	
- Other Expenditures	776,600		961,500	(184,900)	1.
Total Other Expenditures	1,624,100		1,802,300	178,200	
Total Expenditures	2,299,100	18.00	2,514,400	(215,300)	2.

Explanation Number:

1. Decrease in other expenditures due to decline in activity level of demonstration projects because of lack of proposals and federal co-funding.
2. Includes 4.00 SY's ($132,200 Actual; $146,400 Estimate) and Operating ($53,500 Actual; $68,000 Estimate) related to the Communications and Community Relations reorganization.

Petroleum Branch

The Petroleum Branch oversees the exploration and development of Manitoba's crude oil and natural gas reserves. Our goal is to maximize the benefits of exploration and development of our resources for the people of Manitoba while minimizing effects on the environment and other land users. To accomplish this goal we ensure that exploration and development occur in accordance with government policy and legislation.

The Petroleum Branch administers provisions under The Mines Act, The Pipe Line Act, The Gas Storage and Allocation Act and regulations under these acts. The legislation and regulations govern the exploration, development, production, transportation, and storage of crude oil and natural gas. The branch is also responsible for The Oil and Gas Production Tax Act. The branch also provides technical assistance to The Oil and Natural Gas Conservation Board.

As well as administering legislation, the Petroleum Branch conducts technical studies and prepares reports. This information provides valuable assistance and encouragement for new exploration and development of our crude oil and natural gas reserves. The branch provides technical information and professional advice to the petroleum industry and information to the general public.

The branch is made up of three sections: Administration, Geology, and Engineering and Inspection. The managers of the three report to the director of the Petroleum Branch.

Administration Section

Responsibilities of the Administration Section include:

- the administration of regulations under The Mines Act governing the disposition of Crown oil and natural gas rights;
- the collection of Crown oil and natural gas royalties;
- the collection of taxes on production from freehold oil and gas rights under The Oil and Gas Production Tax Act; and
- the administration of the Manitoba Drilling Incentive Program and the Enhanced Oil Recovery Incentive Program.

Petroleum Revenues - The Administration Section is responsible for the timely collection of petroleum revenues. We conduct the twice yearly sale of Crown leases and exploration reservations. The section collects annual lease rentals, monthly Crown royalties and freehold oil taxes. One of our duties is the processing of lease renewals and extensions. We are also responsible for the enforcement of other provisions under the Petroleum Crown Leasing Regulation and the Petroleum Crown Royalty and Incentives Regulation.

During 1989, the Administration Section collected $9.4 million in revenues from the petroleum industry. These revenues comprise $2.3 million in Crown oil royalties, $6.8 million in freehold oil taxes and $0.3 million in Crown lease sale bonuses, rentals, and fees (Figure 3). This represented an 11 per cent increase from 1988.

These figures exclude other provincial revenues from corporate capital tax, sales tax, municipal tax, and corporate and individual income tax.

An Overview of Crown Lease and Exploration Reservation Sales

The Administration Section held two Crown oil and natural gas lease sales in 1989. Thirty-one leases covering 2 832 hectares were sold for a total of $240,548, down 33 per cent from 1988's lease revenue total of $358,462.

The first lease sale was held on April 26, 1989. At that sale the average lease bonus price paid per hectare was $47.02. At the second sale on November 8, 1989, the average lease bonus price increased by 182 per cent to $132.75 per hectare. Compared to 1988 figures, the average lease bonus price in 1989 decreased by 19 per cent, from $101.62 to $81.89 per hectare. No exploration reservations were sold.

The highest lease bonus price paid in the April sale was $195.31 per hectare. Empire Land Services (1987) Ltd. paid $195.31 per hectare for a parcel located southeast of Oak Lake. At the November sale Omega Hydrocarbons Ltd. paid the highest price of $400.17 per hectare for a parcel just east of Waskada.

Lease sales in 1989 generated the lowest revenue since lease sales were re-implemented in 1979.

Since Crown oil and gas lease sales resumed in 1979, the province has received $15,505,853 in revenue from the disposition of Crown leases and exploration reservations.

As of December 31, 1989, 33 636 hectares of Crown oil and natural gas rights were under disposition. Crown leases accounted for 31 524 hectares of this total (94 per cent) and exploration leases for 2 112 hectares (6 per cent). Compared to 1988, the total area under disposition decreased by 34 per cent.

Data Collection - The section collects and publishes monthly oil production data and data on the disposal and the injection of salt water for all active wells in the province.

Incentive Programs - The Administration Section administers the Manitoba Drilling Incentive Program and the Enhanced Oil Recovery Incentive Program. Both programs provide incentives to companies active in the province to conduct exploration and development.

Manitoba Drilling Incentive Program (1987-1991)

The current Manitoba Drilling Incentive Program runs from January 1, 1987 to December 31, 1991. The program exempts companies from payment

of royalty or tax on a "holiday volume" of oil produced from qualifying new oil wells. The "holiday volume" varies for each well but cannot exceed a maximum of 10 000 cubic metres or five years of production, whichever comes first.

Since the program began 172 wells have qualified to receive holiday oil volumes. Of those wells 116 (67 per cent) are producing from freehold rights. The other 56 wells (33 per cent) are producing from Crown oil and gas rights. The average volume awarded per well has been 1 794.3 cubic metres.

Fifty-two of the wells in the program have produced the holiday volume granted. These wells now produce "new oil" for royalty and tax purposes.

Manitoba Drilling Incentive Program (1979-1987)

Thirty-six of the 1,581 wells capable of producing oil in the province produce under the Manitoba Drilling Incentive Program (1979-1987). These 36 wells qualified for special reduced Crown royalty/tax rates.

Enhanced Oil Recovery Incentive Program

The Enhanced Oil Recovery Incentive Program is designed to maximize oil recovery by encouraging enhanced oil recovery (EOR) projects.

Wells in new or enlarged EOR projects approved after January 1, 1987, and fully implemented prior to January 1, 1992, are eligible for an incentive period of up to 60 months. During this period, the operators benefit from reduced Crown royalty and tax rates on production from the projects.

Four enhanced oil recovery projects involving 69 tracts have received incentive periods under the program.

Geology Section

The Geology Section prepares reports on Manitoba's petroleum geology and hydrocarbon potential to encourage and assist in the exploration and development of the province's petroleum resources. It also administers the Petroleum Geophysical Regulation. Under this regulation two geophysical licenses, covering approximately 40 kilometres, were issued in 1989.

The section also assists The Oil and Natural Gas Conservation Board in the designation of field and pool boundaries.

Engineering and Inspection Section

The Engineering and Inspection Section is made up of an engineering component and an inspection component, each reporting to the chief petroleum engineer.

Engineering Component

Under the authority of the Petroleum Drilling and Production Regulation the engineering component issues new drilling licences and processes applications to recomplete, suspend, or abandon wells. It also issues permits for all field processing facilities. In 1989, a total of 54 drilling licences were issued.

The engineering component also provides technical support to The Oil and Natural Gas Conservation Board in processing applications related to well spacing, off-target drilling, production allowables, salt water disposal, pressure maintenance, gas conservation, and unitization.

Technical studies are undertaken of oil and gas reserves and enhanced recovery potential. Information and advice are provided to the petroleum industry and the public.

Inspection Component

The inspection component enforces regulations under The Mines Act that are related to geophysical, drilling, production, and pipeline operations. The component has district offices in Virden and Waskada. Staff license and inspect field facilities, investigate complaints, witness specific operations, and interpret and communicate departmental or regulatory requirements to industry personnel.

The inspection component also manages a program of environmental protection involving the reclamation of all oil or salt water spill sites.

Manitoba's Petroleum Industry

The Petroleum Branch's overview of the petroleum industry in Manitoba summarizes industry activity over the last year.

Production and Markets

The province had 1,353 producing oil wells in December, 1989. This is a 1 per cent decrease from December, 1988. Total annual crude oil production in 1989 decreased for the third straight year to 722 820 cubic metres. This represents a 6 per cent decrease from 1988.

Of Manitoba's total oil production in 1989 the Virden Field accounted for 40 per cent, the Waskada Field produced 25 per cent, and the Daly Field supplied 20 per cent. The South Pierson Field experienced the largest increase in oil production, an increase of 5 819 cubic metres or 22 per cent. The only other field to have an increase in production was the Kirkella Field with a 398 cubic metre or 4 per cent increase.

Of the total amount of oil purchased by refiners in 1989 approximately 49 per cent was refined in Ontario, 20 per cent was used by refiners in Quebec, and 31 per cent went to refineries in the United States.

Oil Prices

Oil prices in 1989 recovered from the lower levels experienced in 1988. Prices climbed during January, February, and March then stabilized for the remainder of the year. The lowest posted price was at the beginning of January, the highest at the end of December. The average monthly price was lowest in February at $114.00 per cubic metre ($18.10 Cdn per barrel) and highest in April at $139.00 per cubic metre ($22.10 Cdn per barrel).

In 1989, Manitoba's overall average crude oil selling price increased 22 per cent to $124.66 ($19.81 Cdn per barrel).

The total value of oil production during 1989 was $90.1 million, up 15 per cent from 1988. Declining production, but higher crude oil prices in 1989, contributed to the increase in the value of production compared to 1988.

Oil Reserves

The size of Manitoba's known oil reserves depends on production and new discoveries. From 1973 to 1980, remaining established oil reserves in Manitoba declined at a rate of approximately 5 per cent per year due to production coupled with a lack of new discoveries. This trend began to reverse in 1980 as new discoveries were made in the Kirkella area. New discoveries in the Waskada area in 1981 further arrested the decline and, as a result of additional development in the area in 1982 and 1983, reserves increased. This increase in the province's remaining established reserves followed more than 16 years of decline.

In 1986, remaining established oil reserves again began to decline. This declining trend has continued through 1989. The trend is largely due to reduced drilling activity. During this period, additions to reserves have not kept pace with production.

As of December 31, 1989, the province's total remaining established oil reserves are estimated at 7.28 million cubic metres (45 million barrels), down 4.8 per cent from 1988.

Exploration and Drilling Activity

Geophysical programs were carried out in the Elkhorn and Coulter areas, but overall geophysical activity in 1989 was at the lowest level since 1975.

Drilling activity also declined for the third year in a row. In 1989, 54 drilling licenses were issued. Nine different oil companies drilled 52 wells. Of these wells, 45 were classified as development wells, while the remaining 7 were exploratory.

Despite the drop in drilling activity, the success rate of wells drilled continued to be high. Eighty-five per cent (44 wells) of the 52 wells drilled were completed as potential oil wells, including one of the 7 exploratory wells.

Areas of Active Development (1989)

Waskada

The most active area in the province in 1989 was the Waskada Field where 21 wells were drilled. Significant development in the northeast part of the field continued.

Virden

A nine well infill program in North Virden Scallion Unit #1, along with eight wells in the southwest part of the field highlighted development in the Virden area.

Daly

Development of the Bakken play in the northwest part of the Daly Field continued in 1989. To date, a total of seven separate Bakken pools have been designated in the Daly Field.

South Pierson

Delineation of significant reserves in the Lower Amaranth and Mission Canyon formations in the South Pierson Field (located in the extreme southwest corner of the province) slowed during 1989 with only one well drilled.

Waskada Gas Plant

The Waskada gas plant is now in its sixth year of production. During 1989 it processed an average of 30 725 cubic metres of raw gas per day. The plant is operating at approximately 36 per cent of its capacity of 85 000 cubic metres per day. This resulted in the recovery of 8 008.8 cubic metres of propane, butane, and condensate valued at approximately $300,000. Compared to 1988, the liquids recovered in 1989 increased by 58 per cent. Of the total liquids recovered propane accounted for 55 per cent, butane 21 per cent, and condensate 24 per cent.

Industry Expenditures

Estimated total industry expenditures in 1989 amounted to $62 million, down from $63 million in 1988. These expenditures can be broken down into seven categories as follows:

Exploration, including exploratory drilling costs, geophysical and geological work: $ 2.0 million

Development costs, including development drilling: $ 8.6 million

Land costs based on freehold, Crown mineral and surface rights acquisition costs, fees, and rentals: $ 3.6 million

Producing facilities, which included mainly capital costs associated with field equipment and enhanced recovery schemes: $ 2.3 million

Production costs, which included well operating, flowline, and gas plant costs: $24.7 million

Royalties, comprising freehold royalties, Crown royalties, and freehold oil taxes: $18.9 million

Other costs, including municipal taxes, right-of-way acquisitions and miscellaneous expenditures: $1.8 million

Total $61.9 million

Petroleum Industry Employment

In 1989, direct employment in Manitoba's petroleum industry was approximately 250 person years, about the same level as in 1988. Of this total, new geophysical and drilling activity accounted for 18 person years, while normal operation and maintenance of existing facilities used the remaining 232 person years.

For each direct job in the petroleum industry, 1.0 to 1.5 additional indirect jobs are created. In one year the petroleum industry generates 250 to 375 person years of indirect employment. Most of these additional jobs are in service and supply companies.

Revenue to Freehold Surface and Mineral Owners

Prior to drilling a well, an oil company is required to negotiate a surface lease with the landowner. In 1989, oil companies paid an estimated $2.7 million to landowners in the form of first-year bonuses ($0.3 million) and annual rental fees ($2.4 million).

Approximately 80 per cent of the mineral rights in southwestern Manitoba are privately owned (freehold). Gross royalties payable to freehold mineral owners, before federal and provincial taxes, were estimated in 1989 at $10.0 million. This figure does not include signing bonuses and

delay rental payments for new and non-producing leases.

Any disputes arising between the petroleum industry and landowners regarding use of land for exploration, development, and related operations may be referred to The Surface Rights Board for arbitration and determination of compensation payable to the landowner. This board is established under The Surface Rights Act, which is the responsibility of the Minister of Rural Development.

Municipal Tax Assessments

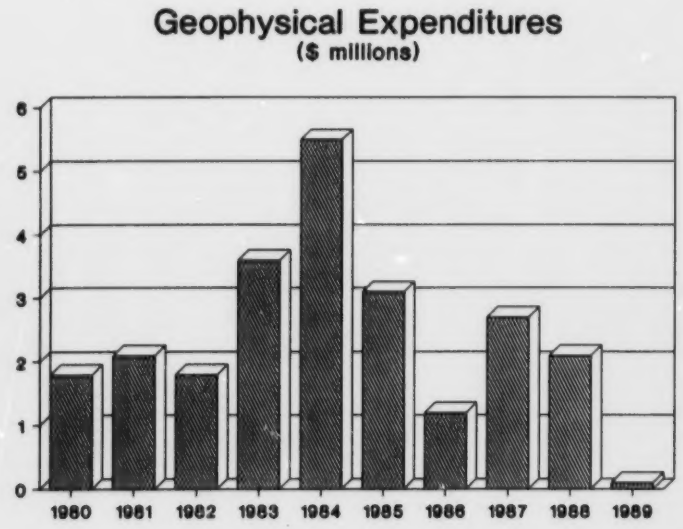
Oil producers in Manitoba are subject to a municipal tax on wells and associated production facilities, which include oil wells, batteries, salt water disposal wells and plants, water injection wells and plants, suspended wells and pipelines.

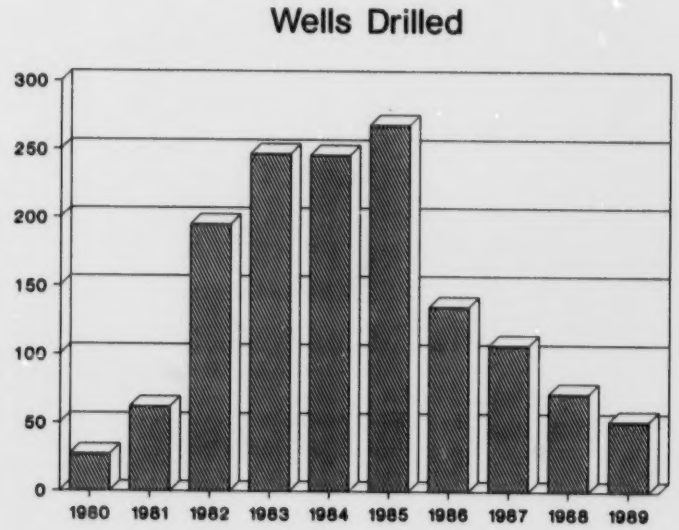
The municipal tax assessment on these facilities for the calendar year 1989 was approximately $9.1 million. Actual tax revenue from these assessments are estimated to be approximately $1.8 million.

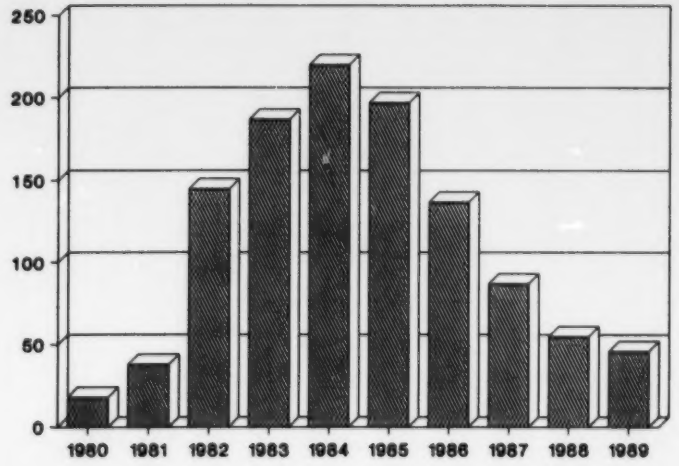
Expenditures by Sub-Appropriation

23-2D Petroleum	Actual 1989/90 $	Estimate 1989/90 SY	Estimate 1989/90 $	Variance Over(Under)
Total Salaries	718,200	20.00	720,400	(2,200)
- Grants/Transfer Payments	3,500		--	3,500
- Other Expenditures	130,400		143,500	(13,100)
Total Other Expenditures	133,900		143,500	(9,600)
Total Expenditures	852,100	20.00	863,900	(11,800)

Figure 2


Geophysical Expenditures
($ millions)
0
1
2
3
4
5
6
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989


Wells Drilled
0
50
100
150
200
250
300
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989


New Producing Wells
0
50
100
150
200
250
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

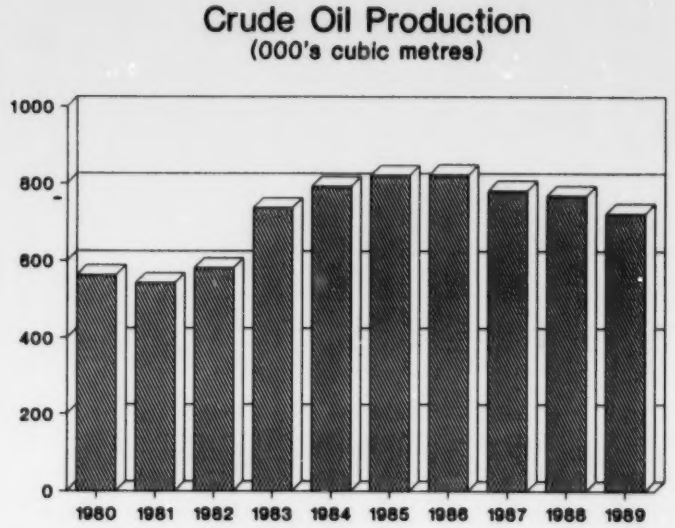
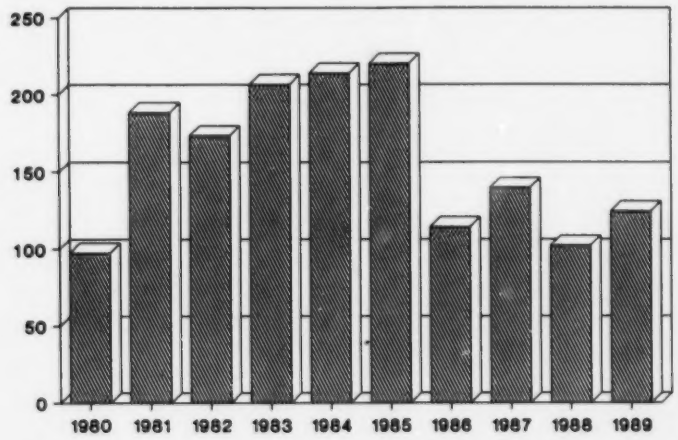
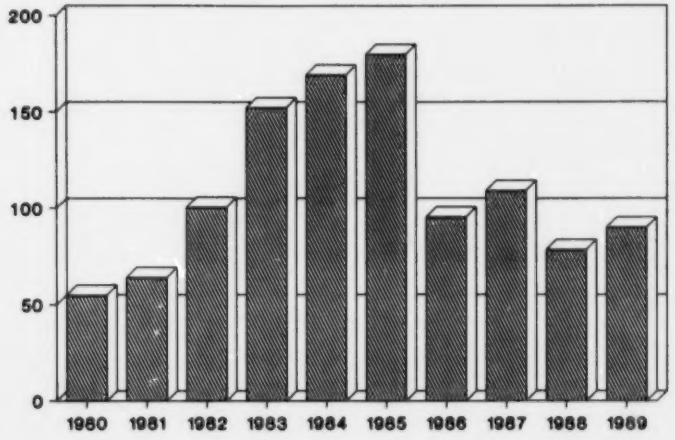

Crude Oil Production
(000's cubic metres)
0
200
400
600
800
1000
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

Figure 3

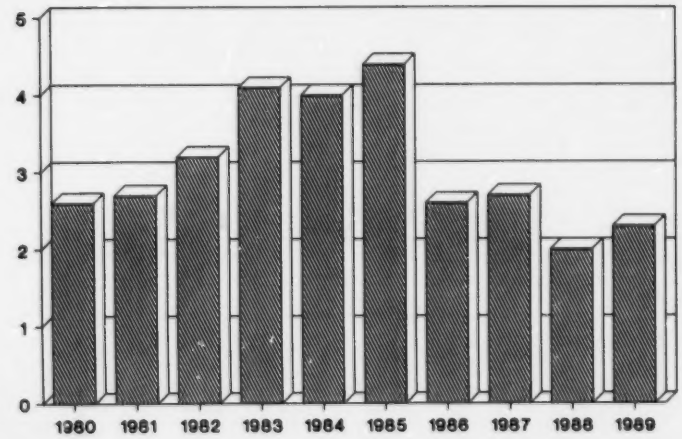
Average Wellhead Price
($ per cubic metre)



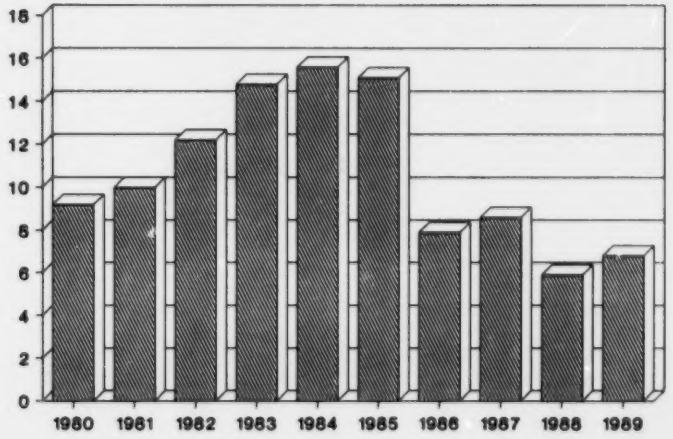
Crude Oil Sales Value
($ millions)



Crown Oil Royalty
($ millions)



Freehold Oil Tax
($ millions)



Oil and Natural Gas Conservation Board

The Oil and Natural Gas Conservation Board is established under The Mines Act. The board has powers to inquire into all matters related to the drilling, production, storage, and transportation of oil and natural gas in Manitoba. The board may conduct hearings and may make orders as specified under The Mines Act.

Board Hearings

No hearings were conducted by the board in 1989.

Board Orders

The board processed a number of applications and issued the following orders and approvals:

Type of Board Order	Order Number	Field/Pool/Well
Field Designation:	F7-89	All Fields
Pool Designation:	P8-89	All Pools
Pressure Maintenance Projects:	PM-60	Virden Lodgepole D Pool
	PM-61	Virden Lodgepole A Pool
Spacing Unit Designation:	SU4	Virden Lodgepole A Pool
	SU5	South Pierson Field - Lower Amaranth B Pool
Salt Water Disposal	38 SWD	Chevron Virden SWD 12-8-9-25 (WPM)
	39 SWD	Tundra Deloraine SWD RE 13-29-2-23 (WPM)
	40 SWD	Omega Waskada SWD 7-18-1-25 (WPM)
Board Approvals		New oil status for incremental production Daly Unit No. 3
		Unit Agreement - North Virden Scallion Unit No. 2

MANITOBA ENERGY COUNCIL

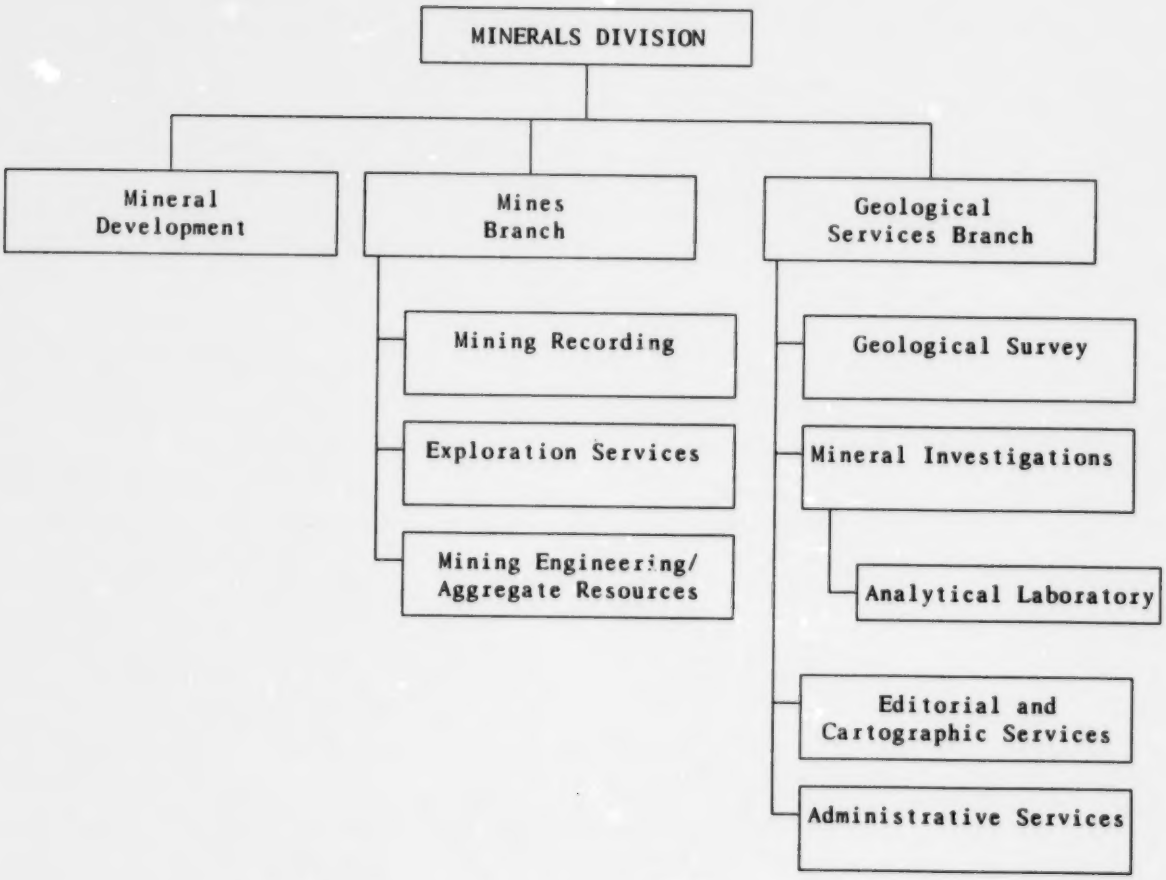
The Manitoba Energy Council was disbanded in 1989.

MINERALS DIVISION

The Minerals Division develops, implements, and manages plans and programs relating to the exploration, development, and production of the province's metallic and non-metallic mineral resources. The division's goal is to encourage the development of these resources in a way that provides maximum benefits to Manitoba with due regard to protection of the environment.

Minerals Division Organization

The Division comprises the Mineral Development Section and the Mines Branch and the Geological Services Branch.



Mineral Development Section

Information gathering and analysis are important functions of the Mineral Development Section. It conducts economic and financial analyses and marketing studies. These analyses and studies provide valuable information that is used to promote opportunities for mineral resources development in our province. The Mineral Development Section monitors provincial, national, and international mineral developments. The section can then provide analysis and evaluation of the economic impact of these developments on Manitoba. As part of its monitoring of current industry trends and changing technologies, the section collects and analyzes provincial mineral statistics. In addition, the section assists in reviewing and developing relevant mineral and mining tax policies.

The section is also responsible for the province's activities under Sector 'C', (Development and Marketing), of the Canada/Manitoba Mineral Development Agreement. Studies and analyses under Sector 'C' focused on improving Manitoba's copper-zinc industry and on developing new opportunities for Manitoba's industrial minerals.

Expenditures by Sub-Appropriation

23-3A Mineral Development	Actual 1989/90 $	Estimate 1989/90 SY	Estimate 1989/90 $	Variance Over(Under)	Expl. No.
Total Salaries	176,400	4.00	201,000	(24,600)	
Total Other Expenditures	33,400		45,000	(11,600)	1.
Total Expenditures	209,800	4.00	246,000	(36,200)	

Explanation Number:

1. Decrease in Other Expenditures attributed to less than anticipated general operating costs.

Mines Branch

The Mines Branch encourages the exploration, development and extraction of Manitoba's mineral resources. It is also our job to see that this development is consistent with the accepted practices of good husbandry. The Mines Branch ensures that the development of our mineral resources provides the maximum benefits to all Manitobans.

The principal responsibility of the Mines Branch is the administration of The Mines Act and regulations governing the disposition of metallic and quarry rights; the exploration, development, and production of the province's mineral resources; and the rehabilitation of mines and quarries. Specific activities include:

- the recording (registration) of mineral dispositions (permits, claims, and leases);
- monitoring and promoting mineral exploration activities;
- rehabilitation of mineral depleted mining lands;
- undertaking an inventory of the province's aggregate resources; and
- implementation of provincial land-use policy dealing with the conservation of aggregate resources.

The branch comprises three sections: Mining Recording, Exploration Services, and Mining Engineering/Aggregate Resources. The section heads report to the Director of the Mines Branch.

Mining Recording

The Mining Recording Section supports mineral development in the province through accurate record keeping and administration of regulations under The Mines Act. Offices are located in Winnipeg, The Pas, and Flin Flon.

As record keeper, the Mining Recording Section maintains up-to-date records of mineral disposi-

tions and all legal transactions relating to mineral dispositions as required by legislation. The general public can access the mining recording computer database on mineral disposition through terminals in each of the three recording offices. Holders of mineral dispositions, departmental staff, and the general public use these facilities extensively.

The second responsibility of the Mining Recording section is the administration of regulations under The Mines Act governing the disposition of Crown mineral rights other than oil and natural gas. These regulations are important to individuals and companies. Only through these regulations can they acquire claims, permits, and leases to prospect, develop, and mine Crown minerals. Staff in the three offices process applications for mineral dispositions, monitor and inspect the activities of disposition holders for compliance with the regulations, and collect fees, rentals, royalties, rehabilitation charges, and cash security deposits.

During 1989, staff recorded 948 mining claims covering a total area of 184 723 hectares. Last year, claims covering 341 722 hectares were recorded. Table 6 in Appendix C shows the number and area of mineral dispositions in good standing at the end of 1989. Table 7, Appendix C, shows details on the types of Crown mineral dispositions issued in 1989.

Total revenue collected during the fiscal year amounted to $2,561.1.

Dispositions, other fees, and rentals	$1,839.5
Royalties on industrial minerals (see Table 2 - Appendix A)	721.6
	$2,561.1
Mining claim taxes (See Table 3 - Appendix A)	71.2
Total	$2,632.3

An increase in revenue of approximately 43 per cent was due to an increase in fees, rentals, and royalties implemented during the fiscal year (January 1, 1989).

Exploration Services

The Exploration Services Section provides support to mining companies and prospectors who are exploring for minerals in Manitoba. To give up to date data to these explorers the section monitors, promotes, and documents all mineral exploration in the province. Staff collects and stores diamond drill core; prospectors may examine non-confidential core. This service eliminates costly duplication of diamond drilling and frees exploration dollars for more productive use. In addition, the section gathers and distributes non-confidential exploration data and compiles bibliographies and indices of Manitoba geology. The section's professional staff performs land-use and mineral potential studies. All of this information is critical to developers of our mineral resources. As guardian of our mineral resources the section also examines reports of work on mineral dispositions for compliance with the regulations under The Mines Act.

During the fiscal year:

Number of mining company personnel visits to the section's office	228
New reports of exploration work received	237
Assessments	313
Number of files reproduced for the private mining sector	470
Number of open assessment files examined by mining industry personnel	1,377
Number of files microfilmed	2,420
Revenue generated from sale of copies of assessment reports	$3.4

The Information Centre staff handles sales of geoscientific reports and maps. This year sales generated $16.1 in revenue for the fiscal year. Staff also responded to 2,886 phone calls and counter inquiries, as well as 191 requests for free publications.

The section prepared the annual summary report for 1989 and released it at the March 1990 convention of the Prospectors and Developers Association of Canada.

Under the Canada/Manitoba Mineral Development Agreement several tasks were completed. The publication, "Bibliography of Manitoba Geology 1795-1988", was released. "Platinum-Group Metals in Manitoba - An Inventory" (open file report OF89-5) was completed. Pegmatite and silver

mineral inventory cards were updated, and base metal cards for parts of the Flin Flon - Snow Lake area were compiled and updated. These Mineral Inventory and corporation files are well used; this year more than 175 clients accessed this information.

Mining Engineering

The first objective of the Mining Engineering Section is to encourage sound mining and rehabilitation practices in Manitoba's mining industry. The second is to monitor mining activities to ensure compliance with The Mines Act and Regulations.

Staff made regular visits to the underground mines in the province to monitor their operations. This year we paid special attention to two operations that received financial aid from the Government of Manitoba.

Staff conducted 2,294 inspections of pits and quarries to monitor compliance with The Mines Act and Regulations. These included both private and Crown operations. The section also provided technical advice about good mining and rehabilitation practices to the industry and other branches of government. The annual census of pits and quarries was administered on behalf of Energy, Mines and Resources Canada.

Section staff contributed to interdepartmental review committees concerning Clean Environment Commission Orders and applications under The Environment Act dealing with the operation and reclamation of mines.

The section reviewed all Crown land transfers, subdivision, development plans, and zoning by-law amendments that were proposed during the year. Where necessary, staff made appropriate technical recommendations to minimize potential conflicts with mineral extraction.

Under Sector B of the Canada/Manitoba Mineral Development Agreement (MDA), eleven research projects on mining and mineral processing were funded by the province during 1989/90. Manitoba mining companies and consultants, the University of Manitoba, and the Mines Branch conducted these projects. The section also gave assistance to eleven federal mining and mineral processing research projects.

Section staff attended an important two day seminar. Over 130 delegates represented industry, government, and academia. Delegates examined various mining and processing projects conducted in 1989, an overview of the 1984 - 1989 Mineral Development Agreement, and possible future directions for this applied research. Preliminary proposals for over fifty future research projects have been developed in preparation for a successor mineral development agreement.

Aggregate Production in Manitoba - 1983 to 1988
(million tonnes)

	1983	1984	1985	1986	1987	1988
TOTAL PROVINCIAL PRODUCTION:	13.50	13.80	16.06	13.18	17.15	16.60
Crown Lease:	0.79	1.88	1.61	1.55	1.7	1.28
(% of total)	5.9%	13.6%	10.0%	11.8%	10.0%	7.7%
Crown Permits:	3.09	2.77	3.44	1.60	2.69	3.49
(% of total)	22.9%	20.1%	21.4%	12.2%	17.3%	21.0%
Private:	9.61	9.16	9.98	8.25	10.42	11.16
(% of total)	71.2%	66.3%	62.1%	62.6%	60.7%	67.3%
Manitoba Hydro	0.00	0.00	1.02	1.77	2.62	0.75
(% of total)			6.4%	13.4%	12.0%	4.5%
Department of Highways	5.37	5.54	4.46	4.67	3.91	4.74
(% of total)	39.7%	40.1%	27.8%	35.4%	22.8%	28.4%

(Note: Department of Highways production is taken from private and Crown lands.)

Aggregate Resources

The Aggregate Resources Section undertakes detailed surficial geological mapping, maintains aggregate resource inventories, and prepares quarry mineral land-use recommendations based on provincial land-use policies. Aggregate resource data and resource management proposals are provided to government, municipalities, and private sector users.

Staff geologists conducted economic evaluations of sand and gravel deposits in the Rural Municipalities of Argyle, Lorne, Franklin, Pipestone and Albert, and the Local Government District of Piney.

In response to requests from Municipal Planning Districts, staff compiled quarry mineral resources data for them. The Municipal Planning Districts will use this information as they plan for the protection of their own quarry mineral resources.

During the year the section released two geological reports and six aggregate resource compilation maps.

In fiscal year 1990/91, we have scheduled economic evaluations of sand and gravel deposits in four municipalities.

Expenditures by Sub-Appropriation

23-3B Mines	Actual 1989/90 $	SY	Estimate 1989/90 $	Variance Over(Under)	Expl. No.
Total Salaries	1,654,500	42.26	1,625,600	28,900	
Total Other Expenditures	644,800		678,600	(33,800)	
Total Expenditures	2,299,300	42.26	2,304,200	(4,900)	1.

Explanation Number:

1. Includes 3.00 SY's ($111,100 Actual; $105,700 Estimate) and Operating ($55,800 Actual; $71,000 Estimate) as a result of Communications and Community Relations reorganization.

Geological Services Branch

The Geological Services Branch generates authoritative information on the geology of Manitoba in order to encourage and guide mineral exploration in the province. In addition, this information provides a data base for developing mineral policy and for use in determining effective land-use policies. The branch makes this information available through published maps and reports.

The Geological Services Branch comprises five sections: Geological Survey, Mineral Investigation, Analytical Laboratory, Editorial and Cartographic Services, and an Administrative Services component. Section heads report to the Director of the Geological Services Branch.

All sections of the branch continued to work closely with the Geological Survey of Canada and with the mining industry through the Mineral Exploration Liaison Committee.

On September 5, 1989, the Department of Energy and Mines opened a new regional office at Flin Flon. This office is staffed by a Recording Clerk and a District Geologist. This extension of year-round services is one of the ways the department supports communities that rely on the mineral industry and is also an effective way to support exploration.

During the year activities of the branch were primarily directed towards completing reports and maps resulting from the previous five years of field surveys mounted under the Canada/Manitoba Mineral Development Agreement (MDA). Numerous publications were issued throughout the year including several additions to the Mineral Deposit series of reports. Listings of federal and provincial outputs generated under the MDA during the five year term (1984-1989) were published in Reports of Field Activities distributed at the November 1989, Meeting with Industry in Winnipeg, and in release notices issued in the intervening period to year end.

The MDA process of developing an annual "workplan" covering survey activities for the forthcoming year was repeated in the spring of 1989. This workplan was distributed to members of the Mineral Exploration Liaison Committee for critical review. Briefing sessions were held in Winnipeg and northern centres to give industry personnel in the regions an outline of federal and provincial programs intended for the summer. An annual Progress Report for Sector "A" Geoscientific Activities conducted during 1988/1989 was released in June 1989.

Throughout the summer months staff geologists led, or participated in, many field demonstrations in the Flin Flon-Snow Lake, Thompson, and Lynn Lake areas for the benefit of industry and overseas geologists. Staff also took an active role in reporting on provincial programs at the September 11-13 Cluster meeting of the United States Geological Survey and State Surveys in Bismark, North Dakota. Staff also gained valuable new insights on Mississippi-Valley-Type lead-zinc deposits at the Mid-Continent Cluster meeting in St. Louis, Missouri.

The branch also participated in three special projects this year. Staff geologists took the opportunity of examining new exposures at the Conawapa hydro development site on the Nelson River, worked with personnel from the Museum of Man and Nature backhoeing sinkholes at Gypsumville for dating and paleontological studies, and continued an ongoing involvement with the exploratory activities of the Speleological Society of Manitoba.

Publications prepared by the branch included the provincial contribution to the new Geological Atlas of the Western Canadian Sedimentary Basin (coordinated by the Canadian Society of Petroleum Geologists), the province's first Geological Map Catalogue, and three new Precambrian bedrock geology compilation maps.

A full account of the branch's mapping programs and mineral investigations was published - the Annual Report of Field Activities - in November, 1989.

Computer use has grown substantially in the branch over the last year. We have undertaken automated drafting and report production using AutoCad and desktop publishing. We are continuing to improve the Paleozoic Stratigraphic Corehole system and to integrate it with Petroleum Branch files. Staff are developing outcrop-level Precambrian geology databases, and we are continuing to evaluate new Geographic Information Systems and spatial analysis software.

As in previous years branch staff also provided ongoing assistance to other components of the Minerals Division by giving commodity reviews and mineral resource assessments for various sections of the province.

Future Programs

During the spring and summer of 1989 the province experienced one of the most widespread and extensive outbreaks of forest fires in recent history. Large areas of new bedrock exposures were opened up, and a comprehensive plan has been developed to take advantage of this opportunity to examine and map these new exposures. This mapping is particularly important in established mining districts where there is potential for discovering new reserves.

Five-year work plans, (1990-1995), encompassing contributions from both the federal and provincial Geological Surveys are well advanced and incorporate numerous suggestions and recommendations from industry exploration personnel. Negotiations between the provinces and the federal government regarding renewal of the Mineral Development Agreements continued throughout the year. On February 14, 1990, the Prime Minister announced the decision to renew the Economic Regional Development Agreements in western Canada. However, the federal government's sectoral priorities remained undefined by fiscal year end, preventing the prompt initiation of a

second round of Mineral Development Agreements in the west.

In the absence of federal approval for a new Mineral Development Agreement the Geological Survey of Canada has embarked on a program using existing resources to implement multidisciplinary studies of the Snow Lake and Ruttan region over the next two to three years. The provincial Geological Services Branch is supporting this initiative.

Expenditures by Sub-Appropriation

23-3C Geological Services	Actual 1989/90 $	SY	Estimate 1989/90 $	Variance Over(Under)
Total Salaries	2,084,800	52.00	2,094,200	(9,400)
- Grants/Transfer Payments	1,500		0	1,500
- Other Expenditures	232,600		234,900	(2,300)
Total Other Expenditures	234,100		234,900	(800)
Total Expenditures	2,318,900	52.00	2,329,100	(10,200)

Expenditures by Sub-Appropriation

23-3D Mineral Development Agreement	Actual 1989/90 $	SY	Estimate 1989/90 $	Variance Over(Under)
Salaries				
- Main Estimate		20.22	236,800	
- Main Estimate Authority for General Salary Increase XXVI			355,400	
Total Salaries	566,000	20.22	592,200	(26,200)
Other Expenditures				
- Main Estimate			450,600	
- Main Estimate Authority from Enabling Vote XXVI			679,500	
Total Other Expenditures	1,053,700		1,126,500	(72,800)
Total Expenditures	1,619,700	20.22	1,718,700	(99,000)

The Mining Industry in Manitoba

The Minerals Division's overview of the mining industry outlines the activity in the industry for 1989. It begins with the estimated value of the total mineral production in Manitoba for 1989. Next, the overview summarizes the exploration projects that the industry has undertaken. Finally, it reports on the mining and processing operations in the province.

Estimated Value of All Mineral Production in Manitoba

Mineral production includes metals, industrial minerals, and fuels. Metals are minerals such as nickel, copper, zinc, or gold. Industrial minerals include stone, gypsum or peat moss. Fuels are petroleum and natural gas. For the 1989 calendar year the estimated value of all mineral production in Manitoba was $1,690.1 million. This is an increase of 3.9 per cent over the $1,626.6 million for 1988 (see Tables 8 and 9, Appendix C). Metal

production alone accounted for $1,476.6 million or 87.4 per cent of the total value of Manitoba's 1989 mineral production.

The following table shows the more significant minerals in terms of value produced in 1989.

nickel	$1,050.0 million (up 0.2 per cent)
copper	170.2 million (up 1.6 per cent)
zinc	156.8 million (up 76.5 per cent)
petroleum	91.8 million (up 16.8 per cent)
gold	60.7 million (down 21.5 per cent)
cement	44.0 million (up 3.8 per cent)
sand and gravel	41.9 million (down 7.2 per cent)

Mineral Exploration

Estimated exploration expenditures in 1989 were $37.0 million compared to an estimated $40.0 million spent in 1988 and well below the $50.0 million spent in 1987. The surface exploration diamond drilling is estimated at 178 000 metres in 1989 compared to 270 969 metres in 1988 and 278 537 metres in 1987. The reduced level of exploration in 1989 reflects falling gold prices and a change in flow-through financing methods.

Since exploration has declined the number of claims has also gone down. Claims recorded in 1989 decreased by approximately 45 per cent compared to 1988. However, new exploration permits acquired in the southern extension of the Thompson Nickel Belt resulted in a 27 per cent increase in the total area of land under disposition.

The strong emphasis placed on gold exploration for most of the 1980's has shifted towards base metals. As a result, in Manitoba, five of the eight advanced mining projects are for base metal deposits.

Base Metals

The following reports show the activity in base metal exploration and development.

Flin Flon/Snow Lake Belt

Hudson Bay Mining and Smelting Co. Limited and Outokumpu Mines Ltd. officially opened the new Namew Lake nickel-copper mine in November, 1988. Full production, expected by April, 1989, was delayed to the end of the year because of unexpected ground water problems. The Namew Mine has reserves of 2.04 million tonnes of 2.47 per cent nickel and 0.8 per cent copper.

At the Callinan copper-zinc property, just north of the main Flin Flon mine, Hudson Bay Mining conducted lateral development on the 2,210 foot and 2,750 foot levels. A ventilation raise from the 1,690 foot level to surface was completed. Undercutting of the ore commenced in 1989 and production is scheduled to begin in April, 1990. Proven reserves stand at 2.36 million tonnes of 1.5 per cent copper, 4 per cent zinc, 1.89 g/tonne gold, and 22.62 g/tonne silver.

In the Snow Lake area, Hudson Bay Mining began producing from the Chisel Lake open pit in February, 1989. The pit is designed for removal of the 1.0 million tonne Chisel Lake mine crown pillar. The average ore grade is 10.5 per cent zinc. The operation will supply zinc ore for the next three to four years. To the north of the Chisel Lake mine, Hudson Bay Exploration has roughly outlined a new discovery. The Chisel North deposit contains 2.45 million tonnes grading 0.2 - 0.3 per cent copper and 9 per cent zinc. In October, the company began a program of fill-in drilling on this deposit and other targets in the vicinity.

During the summer, Minnova Inc. conducted an extensive mapping and sampling program on the Big Island property optioned from Westfield Minerals Limited and Goldbrae Developments Ltd. Minnova began a 4 500 metre drill program in January.

Other noteworthy base metal exploration projects conducted in the Flin Flon - Snow Lake belt in 1989 included:

- Hudson Bay Exploration in the Clearwater Lake, Namew Lake, and Snow Lake areas;
- Granges Inc. in the McClarty Lake, Athapapuskow Lake and Snow Lake areas;
- Falconbridge Limited in the Herblet Lake, Norris Lake, Cook Lake, and Dickstone mine areas; and
- Cominco Ltd. in the Clearwater Lake and The Pas areas.

Lynn Lake Belt

In the Lynn Lake belt, base metal exploration was carried out by Manitoba Mineral Resources Ltd. in the Granville Lake - Laurie River area and by Hudson Bay Exploration at the Ruttan Mine - West Anomaly. Hudson Bay is conducting a large underground and surface exploration program at Ruttan to extend the operating life of this operation.

Thompson Nickel Belt

Inco Limited continued with the exploration and development of new nickel reserves in and around Thompson. Development work at the 4.5 million tonne Thompson Mine 1-C Deposit consisted of 1 200 metres of drift and ramp advance. The remaining 350 metres of drifting and raising will be completed by 1991. The 1-C deposit is expected to be producing at a full capacity of 1 350 tonnes per day in 1993.

Dredging work to remove overburden for Inco's new South Pit in Thompson commenced in 1989. Five million cubic metres of overburden and 800 000 cubic metres of rock is to be removed by August, 1990. Full production at a rate of 3 630 tonnes of ore and 10 900 tonnes of waste per day is forecasted for October, 1990. Total capital appropriated for this project is $42.1 million.

Inco is also proceeding with a resumption of production from the Birchtree Mine, southwest of Thompson. This mine is estimated to contain reserves of 317.5 million kilograms of nickel. Development work to be completed by the end of 1989 included 1 675 metres of drifting, 135 metres of raises and the reopening of all major levels and ramps. Production will initially be at a daily rate of 1 100 tonnes increasing to 2 725 tonnes per day by 1995.

The southwest extension of the Thompson Nickel belt received a good deal of new activity in 1989. Sparked by strong nickel prices, Falconbridge acquired three exploration permits covering ground in the William Lake, Moose Lake, and Cedar Lake areas. Manitoba Mineral Resources acquired two permits in the Minago River area. Both Falconbridge and Manitoba Mineral Resources flew airborne surveys and conducted follow-up ground geophysics over their permit areas. Falconbridge began drilling some targets in the Moose Lake area before Christmas, 1989, and Manitoba Mineral Resources began drilling before spring breakup. In early 1990, Cominco Ltd. was in the process of acquiring a large permit extending from Cedar Lake south across Lake Winnipegosis to the Swan River area.

In June, Black Hawk Mining Inc. purchased the rights of the Minago nickel property from Canamax Resources Inc. and Granges Inc. This property was discovered in the late 1960's by Amax. Subsequent drilling had outlined a geological reserve of 2.0 million tonnes grading 1.64 per cent nickel in five zones. Sixty-five per cent of the known mineralization was in the Main zone.

By mid December, Black Hawk had completed an 8 200 metre drill program that has apparently doubled the reserve base from 3.6 million tonnes of 1.28 per cent nickel to 7.5 million tonnes grading 1.29 per cent nickel. Black Hawk resumed drilling a series of long holes in 1990 designed to test the deposit at the 600 metre level and to follow-up on the best results thus far encountered at the property.

Southeastern Manitoba

In southeastern Manitoba, exploration included the following programs.

- Quillo Resources Inc. flew an airborne geophysical survey and conducted a diamond drill program in the Black Island - Manigotogan area.
- Manitoba Mineral Resources Ltd. and Milestone Resources Corp. conducted separate drilling programs in the Bird River area.
- Granges Inc. carried out geophysical surveys and a substantial drill program in the East Braintree-Whitemouth River area.

Precious Metals

The following reports outline by area events in the production of precious metals in Manitoba.

Flin Flon/Snow Lake Belt

The gold mining industry in Manitoba experienced major setbacks in 1989. Pioneer Metals Corporation closed the Puffy Lake gold mine in May, Granges Inc. indefinitely suspended operations at their Tartan Lake gold mine beginning in October, and LynnGold Resources Inc. shut down the MacLellan Mine in November. These mining operations

fell victim to falling gold prices and high production costs.

News was more encouraging at the old Nor-Acme Mine in Snow Lake, where Inco Gold Company completed a $6.5 million exploration and development program. Inco Gold can earn a 50 per cent interest in the property from High River Gold Mines by placing the former producer back into production. The 1989 program consisted of 18 000 metres of drilling, 730 metres of drifting and crosscutting, and removal of a 7 930 tonne bulk sample. A feasibility study prepared by Inco Gold and Wright Engineers estimated that it will cost $50 million to put the mine back into production.

Two other former producing properties in the Flin Flon - Snow Lake belt received considerable attention in 1989. At the Ferro Mine, southeast of Snow Lake, Pierce Mountain Resources obtained encouraging drilling results at the Ferro Mine zone and at the newly discovered Gold Dust Shear zone.

Near the old Gurney mine site, east of Flin Flon, operator Granges Inc. and partner Mid-North Resources completed a 28 hole drill program.

Lynn Lake Belt

A feasibility study was completed in 1989 on the Farley Lake deposit by co-holders Manitoba Mineral Resources and Mingold Resources Inc. The deposit is estimated to contain 2.23 million tonnes grading 3.6 g/tonne gold of open pit reserves in two zones. There are no plans to put the deposit into production at the present time.

Eastern Manitoba

At the Little Stull Lake property close to the Ontario border, operator Westmin Resources Limited and partner Tanqueray Resources Ltd. conducted a 10 000 metre drill program. Since 1986, 184 holes have been drilled, outlining gold mineralization in at least four zones.

Noranda Exploration Company Limited continued its exploration program in the Gods Lake area. It also undertook geophysical surveys and drilling at Knee Lake, Knight Lake, and Gods Lake. Noranda recently signed an agreement with Lithium Corp. of Canada that gives Lithium the right to earn a 50 per cent interest in Noranda's Oxford Lake group of properties.

Rice Lake Belt

Rea Gold Corp. has purchased the former San Antonio Gold Mine at Bissett from Cassiar Mining Corp. .for $3.2 million plus other considerations. Rea has started a detailed feasibility study of the property where recent estimates give reserves of 1.1 million tonnes grading 7.6 g/tonne gold below the 26th level.

Bakra Resources Ltd. completed 16 holes on the Sannorm property near Bissett. Drilling programs were also carried out by Crack Resources Ltd. at Wallace Lake and at Moose Lake, by Quillo Resources Inc. near Rice River, by Dynamic Consolidated Resources Ltd. at Wanipigow Lake, by Grizzly Creek Resources at Gem Lake and by H. Steinleitner at Mabel Lake. Overburden drilling was conducted on properties near Bissett by Tulsa Resources Limited. Other companies involved in various prospecting, geological, and geophysical programs included Noranda Exploration, International Falcon Resources Ltd., and Westshield Consulting.

South of the Rice Lake belt, Maskwa Nickel Chrome Mines Ltd. carried out diamond drilling in the Cat Creek area, and Noramco Mining Corp. conducted geological mapping, geophysics, and diamond drilling at Falcon Lake.

Other Mineral Commodities

Exploration for pegmatites took place in the Bird River area by Tantalum Mining Corporation of Canada Limited and Springsyde Resources Ltd.

Mining and Processing

Metallic Minerals

Mining for metallic minerals is concentrated in the Flin Flon - Snow Lake area, the Lynn Lake/Leaf Rapids area, and at Thompson and Bernic Lake (see Figure 8). Many different companies operate in these areas.

Hudson Bay Mining and Smelting Co., Limited

Hudson Bay Mining and Smelting Co., Limited operates several mines in the Flin Flon - Snow Lake area, concentrators at Flin Flon and Snow Lake, copper smelting and zinc and cadmium

refining facilities at Flin Flon, and the Ruttan copper/zinc mine and concentrator at Leaf Rapids. Besides treating ores from company owned mines, the company processed concentrates from the Trout Lake joint venture at its Flin Flon facility during 1988. The principal products from Hudson Bay's Manitoba facilities are anode copper, refined zinc, refined cadmium and lead concentrate.

In the Flin Flon area, the company operated the Flin Flon Mine and the Trout Lake joint venture on a continuous basis. The Centennial Mine was shut down in April, 1988, and the Westarm Mine remained idle.

In mid 1989, the Namew Lake Mine, which was opened in 1988, achieved full production of 1 300 tons per day. This is a joint venture. Hudson Bay Mining and Smelting owns 60 per cent, and Outokumpu Oy owns 40 per cent. The mine, located 60 kilometres south of Flin Flon, produces nickel and copper concentrates. The copper concentrate is shipped to Flin Flon. Hudson Bay's share of the nickel concentrate is processed at Fort Saskatchewan, Alberta, by Sherritt Gordon. Outokumpu Oy's share is processed at Thompson by Inco.

In the Snow Lake area, the company operated four mines during 1989. The 3 500 tonnes per day concentrator at Stall Lake, produces copper and zinc concentrates that are shipped to Flin Flon for further processing. The concentrator also produces a lead concentrate that is shipped to Trail, B.C. The Stall Lake, Spruce Point, and Rod mines, all of which are underground mines, and the Chisel Lake open pit mine all operated throughout the year.

Copper and zinc concentrates produced at the Ruttan mill are trucked to Lynn Lake for rail shipment to Flin Flon.

At the end of 1989, approximately 2,300 people were employed at the company's mines and processing facilities in Manitoba. In addition, 300 people were employed at company operations on the Saskatchewan side of the border.

Inco Limited

During the year, Inco Limited operated the Thompson mine, concentrator, smelter, and nickel refinery. The main product from the Thompson complex is electrolytic nickel. By-products include copper matte, cobalt oxide, and pentlandite concentrate. Copper matte is shipped to the company's refinery at Copper Cliff, Ontario. Commercial grade cobalt oxide is shipped to the company's refinery at Clydach, Wales, where refined cobalt oxides and salts are produced. Pentlandite concentrates are sold as feed for Sherritt Gordon's nickel refinery at Fort Saskatchewan, Alberta.

Approximately 2,100 persons were employed at Inco's Manitoba operations during 1989.

Tantalum Mining Corporation of Canada Limited (TANCO)

In 1984, TANCO, with financial assistance from the federal government, modified the existing tantalum mill to establish a pilot plant. The plant produced a high quality, low iron spodumene concentrate that can be used directly in the manufacture of such items as Corning Ware and similar products. As a result of favourable tests, sales were made to plants in the United States, France, and Japan, and TANCO built a new spodumeme processing plant at a cost of $6.4 million.

Tantalum mining operations at TANCO's Bernic Lake Mine remained suspended until August, 1988. At that time a $4.7 million project to refurbish the mill so that it produced both spodumene and tantalum simultaneously was completed. Tantalum production recommenced in September, 1988. At the end of 1989, TANCO's Bernic Lake operations employed 106 people.

Industrial Minerals/Structural Materials

Industrial minerals produced in Manitoba include a wide variety of raw materials for the construction industry and specialized users. The production and value of industrial minerals and structural materials for 1988 are given in Table 8, Appendix C.

Non-swelling bentonite, used mainly in the clarification of petroleum and vegetable oils, is mined by Pembina Mountain Clays Inc. near Morden. It is shipped to the company's plant in Winnipeg for treatment with sulphuric acid to increase its absorbency. Pembina Mountain Clays is the only producer of non-swelling bentonite in Canada.

Gypsum is produced by Domtar Construction Materials Ltd. at Gypsumville for use in the company's wallboard plant in Winnipeg. Westroc Industries Ltd. also produces gypsum at Harcus,

near Amaranth, for its wallboard plants in Winnipeg and Saskatoon.

Portland cement production comes from the Genstar Cement Limited plant at Fort Whyte. This plant uses local clay and silica sand and limestone quarried at Steep Rock. In addition, Portland cement is produced at the Canada Cement LaFarge Ltd. plant at Fort Whyte from clinker imported from Alberta.

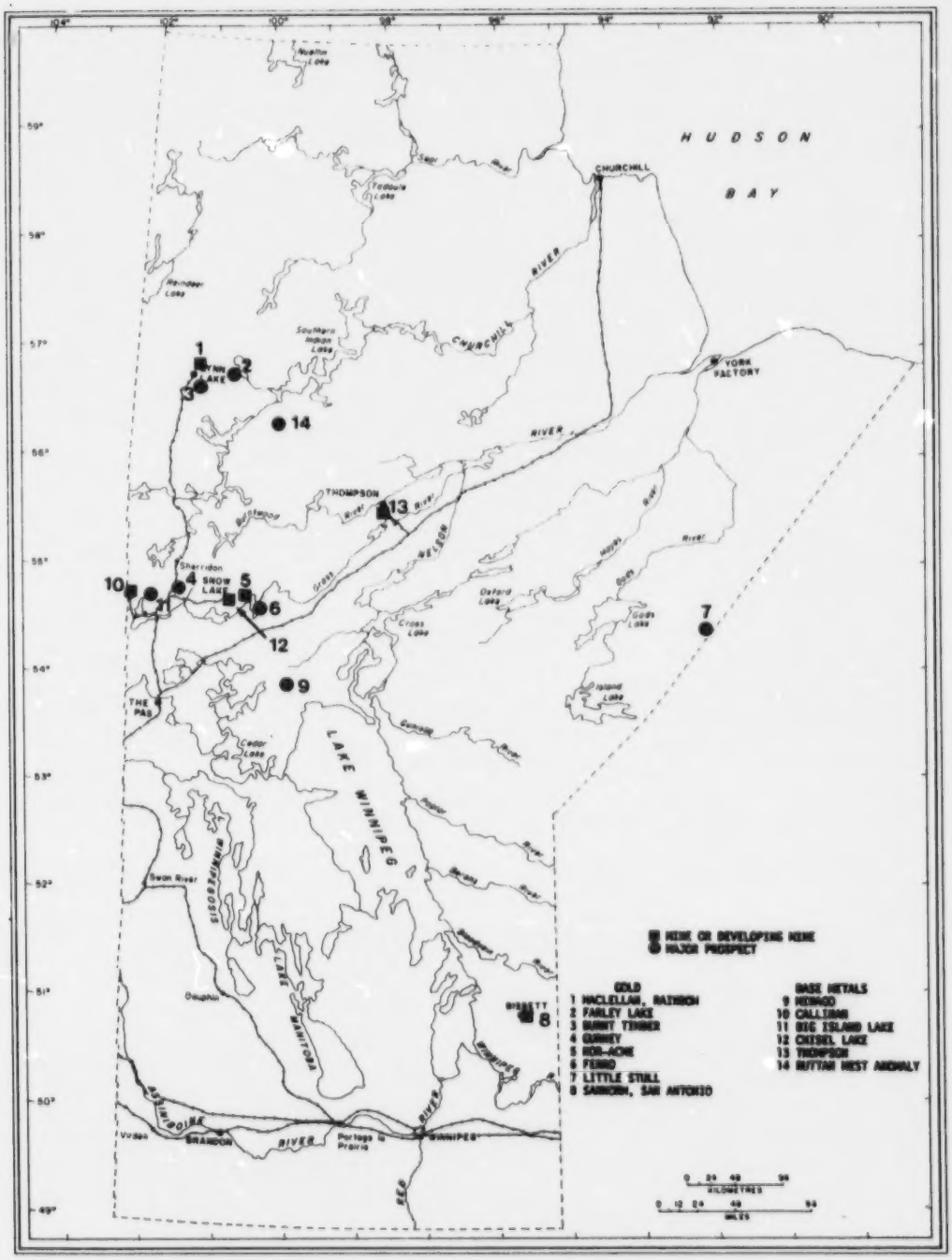
Limestone is also quarried north of Mafeking by Genstar to supply the company's cement plant at Regina.

Peat moss, for horticultural use, is produced from sphagnum bogs in southeastern Manitoba. Fisons Western Corporation operates four bogs near Moss Spur, Julius, and Elma. A fifth bog near Giroux was brought into production in the spring of 1983 by Premier West Peat Moss Ltd. Both companies produce a "value-added" product that combines fertilizer with the peat moss.

A variety of other industrial minerals are produced in Manitoba. Continental Lime Ltd., formerly Steel Brothers Canada Ltd., produces lime from kilns in Winnipeg and Faulkner. Limestone and dolomite are quarried at Garson by Gillis Quarries Ltd. for building stone. Crushed rock is produced by numerous operators in the Interlake region and elsewhere. Cold Spring Granite (Canada) Limited and Whitemouth Granite and Stoneworks operate granite quarries in the Lac du Bonnet area primarily for the production of building stone. High quality silica sand quarried from Black Island in Lake Winnipeg by the Selkirk Silica Division of Marine Transport Limited is exported for use in glass-making, as foundry sand, for sand blasting, and as a filtering medium.

Figure 4

Major Exploration Projects 1989-1990



Exploration Indicator Trends in Manitoba

Figure 5

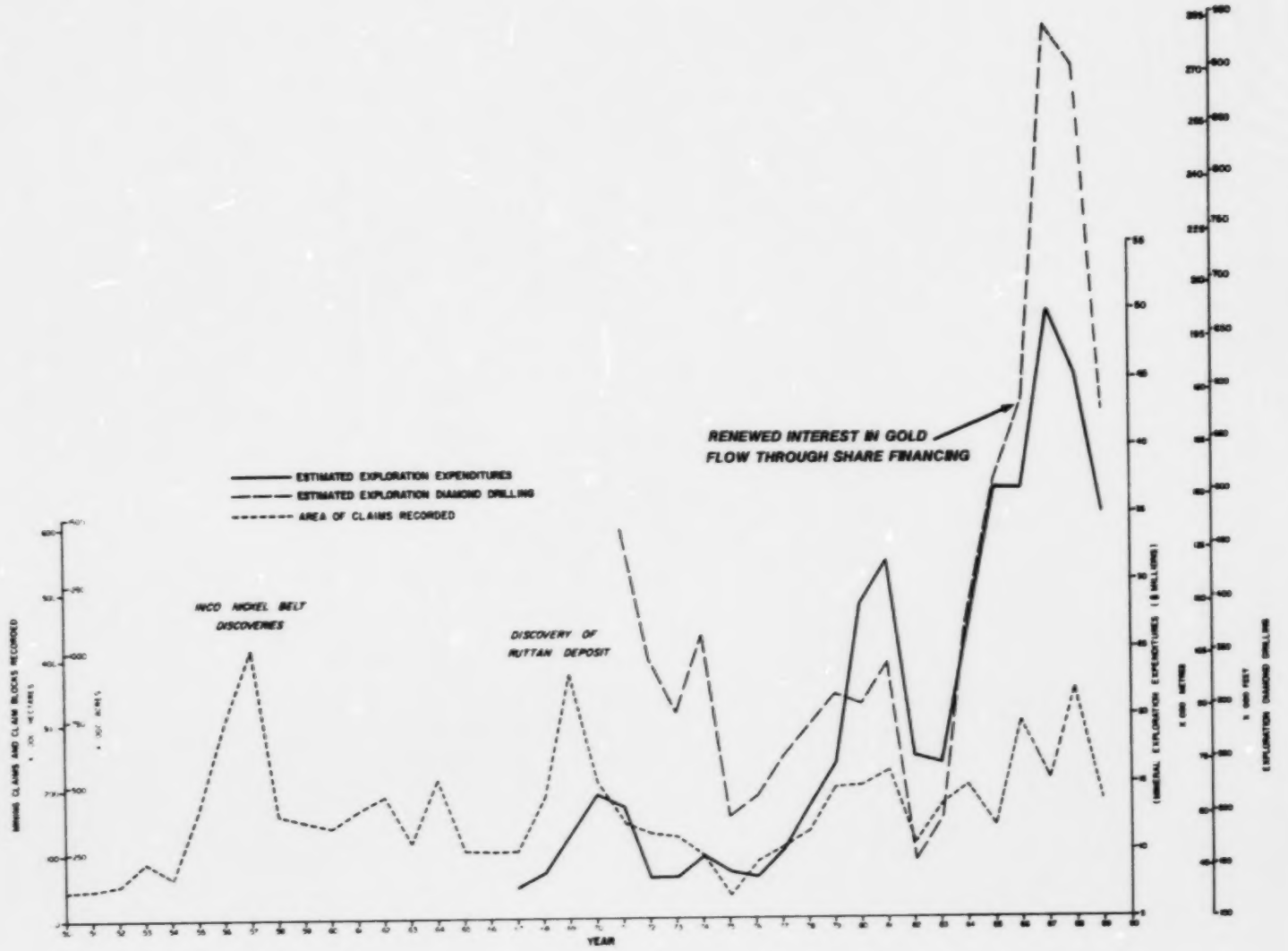
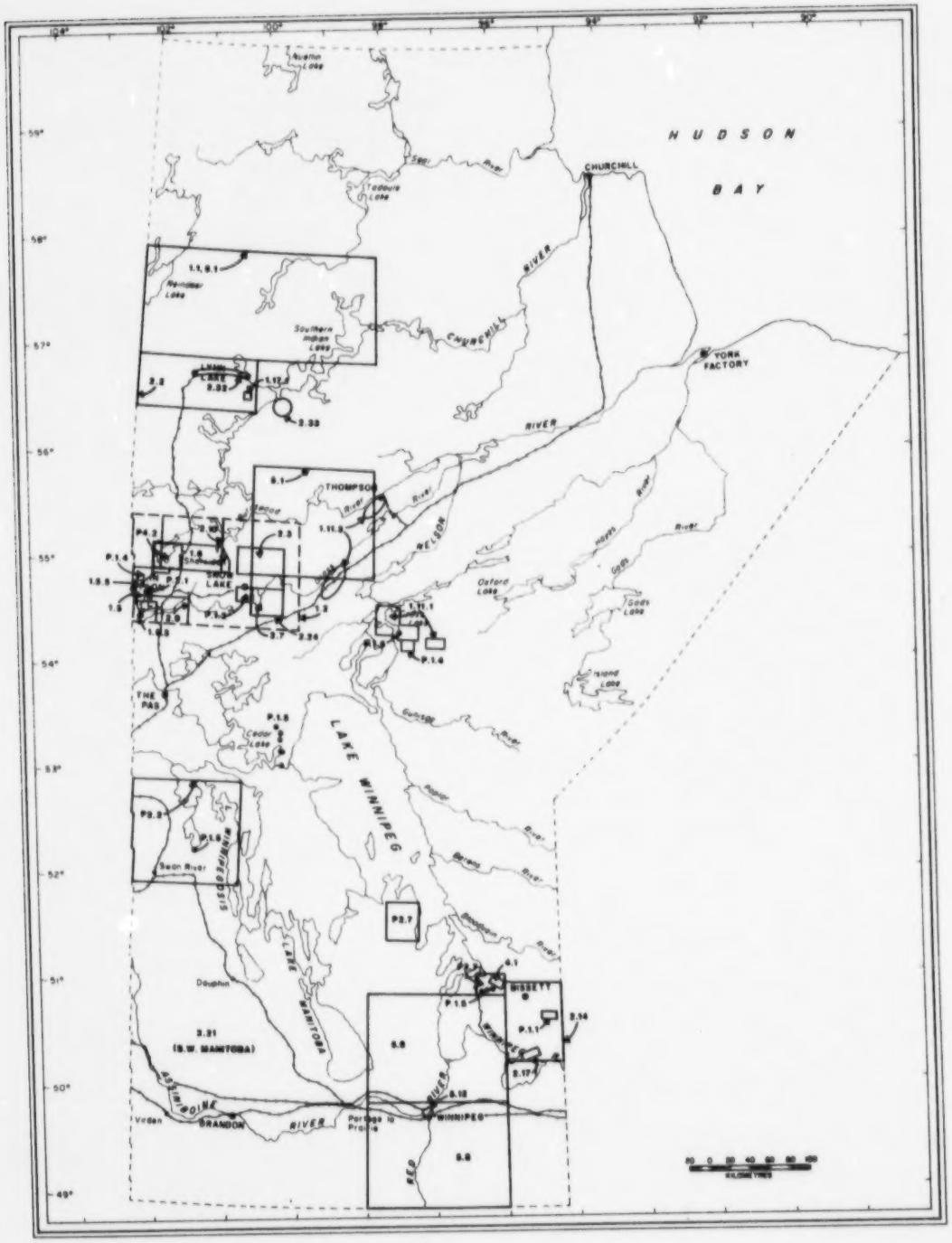

ESTIMATED EXPLORATION EXPENDITURES
ESTIMATED EXPLORATION DIAMOND DRILLING
AREA OF CLAIMS RECORDED
INCO NICKEL BELT DISCOVERIES
DISCOVERY OF RUTTAN DEPOSIT
RENEWED INTEREST IN GOLD FLOW THROUGH SHARE FINANCING
YEAR

Figure 6

Location of Provincial Projects 1989/90



Location of Field Projects, 1988/89

MAP LEGEND

Lynn Lake District

1.1 Geological mapping, Big Sand-Brochet area
- D.C. Schledewitz

1.17.1 Alkaline intrusions
- W.D. McRitchie

2.2 Lynn Lake, Johnson Shear
- D.A. Baldwin/Vacant

2.32 Lynn Lake iron formations
- D. Parbery/M.A.F. Fedikow

2.33 Deposit Geology, Ruttan
- D.A. Baldwin/Vacant

P 2.4 Deposit Geology, Lynn Lake
- K. Ferreira

Flin Flon District

1.2 Uranium-lead isotope, Flin Flon
- A.H. Bailes/E.C. Syme

1.5 1:20 mapping, Flin Flon-White Lake
- A.H. Bailes/E.C. Syme

1.5 1:20 mapping, Athapapuskow
- E.C. Syme

1.5.5 Tartan Lake; 1:20 mapping
- H.P. Gilbert

1.6 Kisseynew south flank
- H.V. Zwanzig/D.C.P. Schledewitz

2.7 Snow Lake gold deposits
- M.A.F. Fedikow

2.9 Occurrence documentation, Flin Flon
- G.H. Gale

2.10 Occurrence documentation, Kisseynew
- G.M. Ostry

2.24 Snow Lake compilation
- M.A. Fedikow

P 1.2 Chisel/Anderson
- A.H. Bailes

P 1.3 Deposit Geology, Flin Flon
- G.H. Gale

P 2.3 Snow Lake gneiss domes
- M.A.F. Fedikow

P 2.5 Kisseynew metallogeny
- G.M. Ostry

Southeast Manitoba

2.14 Occurrence documentation, Rice Lake
- P. Theyer

2.17 PGE potential
- P. Theyer

P 1.1 Manigotagan mapping
- W. Weber

P 2.7 Industrial Minerals, Southern Manitoba
- B.E. Schmidtke

Thompson-Cross Lake District

1.11.1 Thompson and Pipe Pit mapping
- J. Macek

1.15 Project management
- W. Weber

P 1.4 Nelson River East
- H.D.M. Cameron

Manitoba General

2.21 Pb/Zn - Paleozoic
- G.H. Gale/W.D. McRitchie

4.1 Basal till investigations
- E. Nielsen/G. Gobert

5.1 Bedrock Atlas compilation
-D.C.P. Schledewitz/D.E. Lindal et al

5.8 Paleozoic compilation
- W. Weber/C. McGregor/R. Bezys

5.9 Bibliographies
- W.D. Fogwill

5.12 Mineral deposit compilation
- R. Eccles/G.H. Gale

P 1.5 Scout drilling
- D. Berk

P 1.6 Computerization
- G. Conley

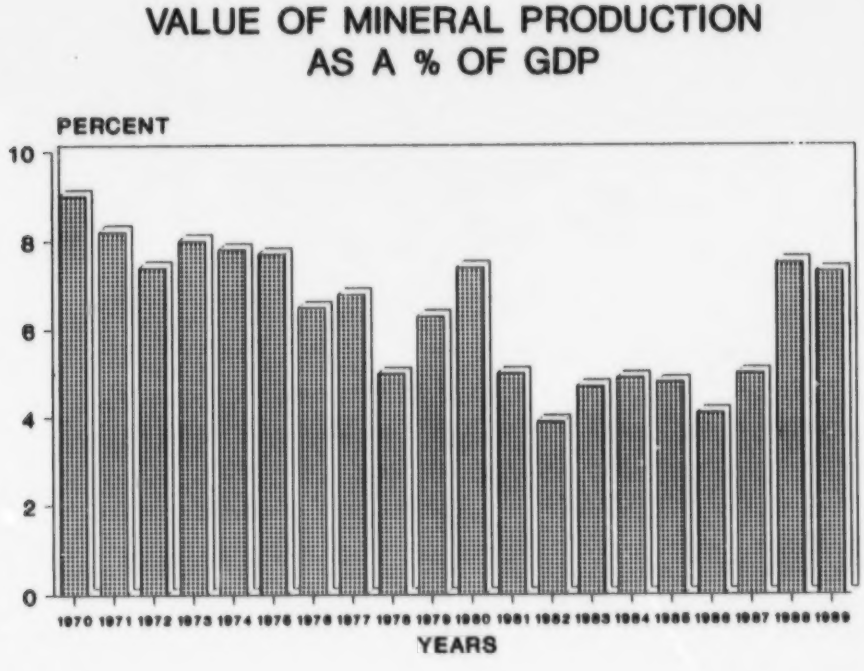
P 2.2 Industrial minerals mapping
- R. Gunter

P 2.6 Computerization
- R. Eccles/E. Su

P 4.2 Basal till geochemistry
- E. Nielsen

Figure 7

Value of Mineral Production in Manitoba 1970 - 1989



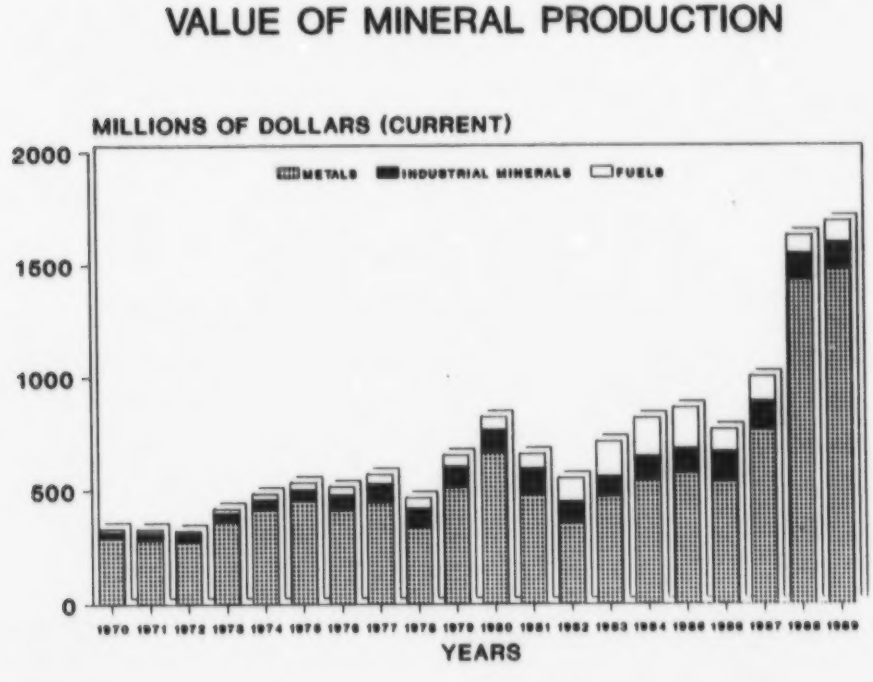
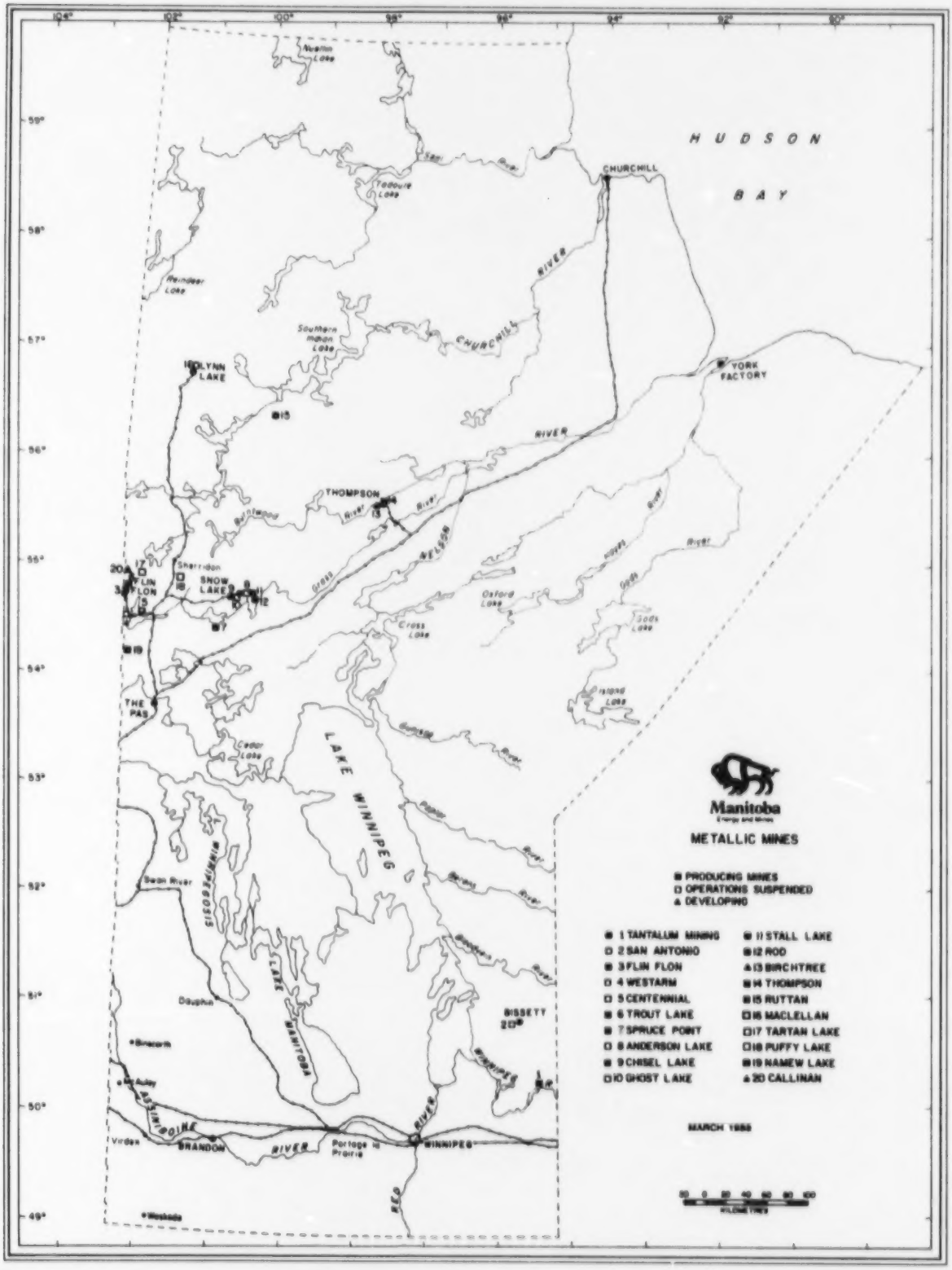


Figure 8

Metallic Mines



Appendix A - Financial Information

Table 1

Energy and Mines Expenditure Summary

for fiscal year ended March 31, 1990
with comparative figures for the previous fiscal year

Estimate 1989/90		Appropriation	Actual 1989/90	Actual 1988/89	Increase (Decrease)	Expl. No.
	23-1	Administration and Finance				
20,600		(a) Minister's Salary	20,500	20,600	(100)	
389,700		(b) Executive Support				
		Salaries	376,500	325,400	51,100	
98,100		Other Expenditures	140,300	82,500	57,800	
		(c) Communications and Community Relations				1
		(d) Administrative Services				
585,100		Salaries	579,300	583,800	(4,500)	2
108,400		Other Expenditures	95,500	103,500	(8,000)	
1,201,900	Total 23-1		1,212,100	1,115,800	96,300	
	23-2	Energy				
		(a) Energy Administration				
90,800		Salaries	93,100	74,600	(18,500)	
10,000		Other Expenditures	9,600	8,100	1,500	3
		(b) Energy Policy				
377,400		Salaries	385,700	590,100	(204,400)	
67,200		Other Expenditures	54,500	242,300	(187,800)	4
		(c) Energy Management				5
712,100		Salaries	675,000	761,200	(86,200)	
1,802,300		Other Expenditures	1,624,100	1,877,100	(253,000)	
		(d) Petroleum				
720,400		Salaries	718,200	650,900	67,300	
143,500		Other Expenditures	133,900	141,800	(7,900)	
0		(e) Manitoba Energy Council	0	0	0	
3,923,700	Total 23-2		3,694,100	4,346.1	(652,000)	

Estimate 1989/90	Appropriation	Actual 1989/90	Actual 1988/89	Increase (Decrease)	Expl. No.
	23-3 Mineral Resources				
	(a)) Mineral Resources Administration				
201,000	Salaries	176,400	159,900	16,500	
45,000	Other Expenditures	33,400	33,100	300	
	(b) Mines				
1,625,600	Salaries	1,654,500	1,589,100	65,400	
678,600	Other Expenditures	644,800	599,700	45,100	
	(c) Geological Services				
2,094,200	Salaries	2,084,800	2,024,400	60,400	
234,900	Other Expenditures	234,100	230,600	3,500	
	(d) Canada/Manitoba Mineral Development				
592,200	Salaries	566,000	669,300	(103,300)	6
1,126,000	Other Expenditures	1,053,700	1,151,300	(97,600)	6
6,598,000	Total 23-3	6,447,700	6,457,400	(9,700)	
1,323,100	23-4 Manitoba Energy Authority	2,048,100	1,667,100	381,000	7
13,046,700	**TOTAL EXPENDITURES**	**13,402,000**	**13,586,400**	**(184,400)**	

Explanation Number:

1 Increase is a result of costs associated with Lynn Lake mine closure $9.2, Flin Flon modernization $17.5, and general operating costs $31.1.
2 Costs have been redistributed to reflect Communications and Community Relations reorganization.
3 Increase is a result of filling staff vacancies.
4 Reorganization resulted in reduction of 5:00 SY's and other staff savings.
5 Decrease in costs associated with natural gas activities.
6 Includes transfers from the Enabling Vote.
7 Increase in costs for Manitoba Energy Authority is related to Dow Corning contracts.

Table 2

Energy and Mines Revenue Summary by Source

for the year ended March 31, 1990
with comparative figures for the previous fiscal year

Actual 1988-1989	Actual 1989-1990	Increase (Decrease)	Expl. No.	Source	1989-1990 Actual	1989-1990 Estimate	Variance	Expl. No.
				Current Operating Programs:				
				Taxation:				
5,705,300	6,889,800	1,184,500		Oil and Natural Gas Production Tax	6,889,800	6,300,000	589,800	
5,705,300	6,889,800	1,184,500	1	Total	6,889,800	6,300,000	589,800	
				Other Revenue:				
				(a) Petroleum				
328,600	162,100	(166,500)		Application Fees, Rentals, Etc.	162,100	241,100	(79,000)	
315,900	231,900	(84,000)		Oil & Nat. Gas Lease Bonus	231,900	250,000	(18,100)	
1,951,900	2,455,800	503,900		Oil & Nat. Gas Lease Royalties	2,455,800	2,000,000	455,800	
2,596,400	2,849,800	253,400		Total	2,849,800	2,491,100	358,700	
				(b) Mines				
1,341,500	1,833,900	492,400		Dispositions, Fees, Rentals, etc	1,833,900	1,643,900	190,000	
443,000	721,600	278,600		Royalties (Industrial Mineral Production)	721,600	921,500	(199,900)	
1,784,500	2,555,500	771,000	2	Total	2,555,500	2,565,400	(9,900)	

Actual 1988-1989	Actual 1989-1990	Increase (Decrease)	Expl. No.	Source	1989-1990 Actual	1989-1990 Estimate	Variance	Expl. No.
				(c) Sundry Revenue				
15,500	16,000	500		Publications, Etc.	16,000	16,000	0	
236,600	1,000	(235,600)		Other	1,000	10,000	(9,000)	
252,100	17,000	(235,100)	3	Total	17,000	26,000	(9,000)	4
				Government of Canada				
0	(400)	(400)		(a) Enerdemo	(400)	0	(400)	
10,338,300	**12,311,700**	**1,973,400**		**Total Revenue**	**12,311,700**	**11,382,500**	**929,200**	

Explanatory Comments Regarding Revenue Increases(Decreases) and Variances:

1 Increase is a result of higher oil prices throughout 1989/90.

2 Increase in mining revenues due to full impact of rate increases in 1988/89, along with an unusually higher forfeiture of payments in lieu of work commitments.

3 Sundry Revenue declined due to recovery of CHEC Loan fees, sale of department-owned vehicles, and staff secondments.

4 Decrease attributed to decline in employee related recoveries.

Table 3

Energy and Mines Other Revenue Collected by the Province

for the year ended March 31, 1990
with comparative figures for the previous fiscal year

Actual 1988-1989	Actual 1989-1990	Increase (Decrease)	Source	1989-1990 Actual	1989-1990 Estimate	Variance	Expl. No.
24,163,700	29,156,900	4,993,200	Water Rentals - Natural Resources	29,156,900	30,928,009	(1,772,000)	
156,076,100	119,057,400	(37,018,700)	Mining Tax - Finance	119,059,400	180,000,000	(60,940,600)	1
71,300	71,200	(100)	Mining Claim Lease Tax - Finance	71,200	76,500	(5,300)	
180,311,100	**148,285,500**	**(32,025,600)**	**Total Other Revenue**	**148,287,500**	**211,005,400**	**(62,717,900)**	

Explanations:

1 Decrease in mining taxation is a result of lower mining profits as a direct result of declining metal prices.

NOTE:The amount of $119,059.4 represents the gross revenue collected; $3,571.8 was transferred to the Mining Community Reserve.

Appendix B - Historical Information

Energy and Mines

Five Year Expenditure and Staffing Summary by Appropriation ($000)

for years ending March 31, 1986 - March 31, 1990

Main Appropriation	Actual/*Adjusted Expenditures									
Administration & Finance	25:50	987,900	27:20	1,109,600	34:46	1,574,200	27:14	1,115,800	25:45	1,212,100
Energy	54:19	3,164,900	52:46	5,273,400	51:04	5,177,500	50:36	4,351,500	45:34	3,694,100
Mineral Resources	121:45	5,812,800	116:51	5,611,100	117:28	5,982,700	117:29	6,452,000	117:05	6,447,700
Manitoba Energy Authority							-	1,667,100	-	2,048,100
Capital		933,500		188,100						
Total	**202:10**	**10,899,100**	**197.13**	**12,182,200**	**203:26**	**12,734,400**	**195:27**	**13,586,400**	**188:32**	**13,402,000**

Appendix C - Statistical Information, Publications, Directory

Table 1

Energy Consumption by Type of Fuel*

Manitoba 1987 - 1989

(terajoules)

Type of Fuel	1987	%	1988	%	1989	%
Refined Petroleum Products **	95 740	46.1	95 980	43.0	93 517	41.6
Natural Gas***	58 502	28.1	69 141	31.0	70 952	31.6
Electricity	47 815	23.0	52 243	23.4	53 575	23.8
Coal and Coke	2 558	1.2	2 373	1.1	2 406	1.1
Natural Gas Liquids***	2 908	1.4	2 875	1.3	3 927	1.7
Steam	346	0.2	416	0.2	356	0.2
TOTAL	207 869	100.0	223 028	100.0	224 733	100.0

Source: *Statistics Canada, Manitoba Energy and Mines*

Note: * *Refers to final energy demand (excluding pipeline fuel).*

** *Includes motor gasoline, diesel and aviation fuel, fuel oil and kerosene.*

*** *Includes propane, butane and ethane.*

Table 2

Energy Consumption by End-Use

Manitoba 1987 - 1989

(terajoules)

End-Use Sector	1987	1988	1989
Residential	39 900	47 005	48 767
Commercial & Public Administration	43 760	50 402	50 252
Industrial	40 303	40 750	42 712
Agriculture	14 660	16 820	18 892
Transportation*			
Retail Pump	45 995	44 946	42 196
Road Transport	7 426	7 427	6 586
Rail	10 428	10 315	10 445
Air	5 385	5 354	4 881
Marine	12	9	2
Sub Total**	69 246	68 051	64 110
TOTAL End Use**	207 869	223 028	224 733

Source: *Statistics Canada*

Note: * *Includes only the use of fuel by the transportation industries.*

** *Excludes natural gas, electricity and refined petroleum used to operate pipeline compressors and compressor stations.*

Table 3

Revenue from Energy Production

Revenue Source	1988/89 ($000's)	1989/90 ($000's)
Crown Oil Royalties	1,952	2,460
Freehold Oil Production Tax	5,705	6,890
Oil Leases Sales, Rental, Fees, Etc.	644	379
Water Rentals*	25,000	30,940
TOTAL	33,301	40,669

**Administered and collected by Department of Natural Resources.*

Energy Consumption by Type of Fuel*

Manitoba - 1989
(Metric and Imperial Units)

Type of Fuel	Metic Units (million)		Imperial Units (million)	
Refined Petroleum Products	2 570.1	litres	565.4	gallons
Gasoline	1 372.8	litres	302.0	gallons
Diesel Fuel	844.1	litres	185.7	gallons
Aviation Fuel	196.8	litres	43.3	gallons
Other**	156.4	litres	34.4	gallons
Natural Gas	1 878.4	cubic metres	66 309.4	cubic feet
Electricity	14 881.9	kilowatt hours	14 881.9	kilowatt hours
Coal and Coke	0.14	tonnes	0.16	tons
NGL's and LPG's	154.3	litres	33.9	gallons
Steam	129.5	kilograms	284.8	pounds

Source: *Statistics Canada, Manitoba Energy and Mines*
Note: *Not adjusted for weather.*
* *Refers to final energy demand.*
** *Includes kerosene and fuel oil.*

Table 4

Energy Units and Conversions

Fuel Type	Metric Unit	Megajoule * Equivalent (10^6 Joules)	Megajoule * Imperial Unit	Equivalent (10^6 Joules)
Refined Petroleum Products	1 litre	36.64	1 gallon	166.57
Gasoline	1 litre	34.66	1 gallon	157.57
Diesel Fuel	1 litre	38.68	1 gallon	175.84
Aviation Fuel	1 litre	35.70	1 gallon	162.29
Other	1 litre	40.75	1 gallon	185.25
Natural Gas	1 cubic metre	37.88	1 cubic foot	1.07
Electricity	1 kilowatt hour	3.60	1 kilowatt hour	3.60
Coal and Coke	1 tonne	16 925.80	1 ton	15 354.80
NGL's and LPG's	1 litre	25.55	1 gallon	116.15
Steam	1 kilogram	2.75	1 pound	1.25

* *To convert terajoules (TJ) to megajoules (MJ) multiply TJ x 1 000 000*
Example: Natural Gas = 82 959 TJ x 1 000 000 = 82 959 000 000 megajoules.
To convert megajoules to natural units divide by MJ equivalent conversion factor.
Example: 82 959 000 000 ÷ 1.07 MJ = 77 531 770 000 cubic feet of natural gas.

Table 5

Manitoba Petroleum Statistics

(1980 - 1989)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Geophysical Licenses Issued	11	11	19	14	23	25	8	13	13	2
Geophysical Expenditures ($)	1,843,438	2,116,854	1,805,512	3,639,692	5,547,086	3,081,241	1,227,227	2,713,000	2,130,000	114,627
Drilling Licenses Issued	29	71	201	284	249	313	116	116	78	54
New Wells Drilled	27	62	195	247	246	268	135	107	72	52
New Wells on Production	18	38	145	187	220	197	137	87	55	46
New Wells Abandoned	9	15	30	24	30	30	11	19	22	9
Metres Drilled	23 508	61 011	184 291	229 304	220 631	231 682	118 675	96 970	63 722	42 948
Wells Capable of Production (Dec)	823	853	1 002	1 160	1 350	1 505	1 592	1 624	1 604	1 581
Wells Producing (December)	720	748	869	1 041	1 209	1 366	1 367	1 434	1 370	1 353
Abandoned Producers	5	5	11	13	30	14	52	28	59	73
Other Wells Abandoned	0	3	8	5	0	1	16	12	21	14
Crude Oil Production (m^3)	563 482	542 695	582 283	736 934	793 286	820 702	823 322	781 806	768 563	722 820
Water Production (m^3)	4 171 051 4	565 210 4	581 786 5	079 609 5	575 632 5	864 460 6	215 248 6	317 251 6	601 841 6	368 365
Total Fluid Production (m^3)	4 734 533 5	107 905 5	163 997 5	816 543 6	368 916 6	685 162 7	038 570 7	099 057 7	370 404 7	091 185
% Water Cut	88	89	89	87	86	88	88	89	90	90
Avg. Oil Production (m^3 per day)	1 540	1 487	1 595	2 019	2 173	2 249	2 256	2 142	2 100	1 980
Value Oil Value ($)	54,958,340	64,054,832	100,537,270	152,349,870	169,296,154	180,049,438	95,336,905	109,202,472	78,660,016	90,106,741
Crown Oil Royalty ($ received)	2,574,515	2,714,733	3,175,625	4,135,497	3,972,225	4,412,927	2,569,969	2,740,130	2,033,807	2,272,971
Freehold Oil Tax ($ received)	9,159,426	10,005,107	12,194,350	14,825,318	15,639,045	15,132,581	7,899,154	8,642,972	5,861,426	6,756,951
Average Oil Price per m^3 ($)	97.57	118.39	173.57	206.64	214.04	220.21	114.26	139.76	102.26	124.66
Reservation Sale Bonuses ($)	820,345	611,199	--	40,192	--	--	20,285	--	84,231	--
Lease Sale Bonuses ($)	1,057,530	1,074,958	1,055,668	1,032,885	2,181,499	4,215,082	891,358	577,253	348,440	231,918
Reservation & Lease Rentals & Fees($)	133,686	191,409	235,812	274,088	281,673	306,792	281,570	277,458	239,048	132,345
Crown Reservation Area (ha)	16 915	22 291	20 947	14 496	1 024	1 024	768	768	2 880	2 112
Crown Lease Area (ha)	29 519	40 806	45 752	57 462	66 053	70 449	66 803	61 712	48 015	31 524
Total Crown Area Under Dispostion (ha)	46 434	63 097	66 699	71 958	67 077	71 473	67 571	62 480	50 895	33 636
Industry Total Expenditures ($)*	38,300,000	55,200,000	82,600,000	116,500,000	121,600,000	138,500,000	86,200,000	81,800,000	62,000,000	62,000,000

* *Source: Canadian Petroleum Association prior to 1985 (before PIP Grants and excluding income and Federal prod. taxes); Petroleum Branch estimate 1985 - 1989.*
(m^3) = cubic metres; (ha) = hectares

Table 6

Mineral Dispositions in Good Standing

at calendar year end 1986 to 1989

	1986		1987		1988		1989	
	No.	Hectares	No.	Hectares	No.	Hectares	No.	Hectares
Mining								
Mining Claims	6 629	872 551	6 965	963 697	7 624	1 132 422	8 102	1 128 568
Order-in-Council Leases	4 184	119 382	4 184	119 382	4 184	119 382	3 661	120 674
Permits	15	401 282	24	395 357	13	324 495	10	218 874
Explored Area Leases	37	14 007*	37	14 008	39	14 994	39	15 316
Production Leases	25	12 612	25	12 612	25	12 612	25	12 612
Miscellaneous Mineral Leases	1	403	1	403	1	403	1	403
Special Permit	-	-	-	-	1	156 876	3	348 496
Former Order in Council Leases							523	10 058
Leases Applied For							12	4 529
Potash								
Permits	1	13 480	1	7 699	-	-	-	-
Leases			1	5 791	1	5 787	1	5 787
Quarrying								
Leases	447	13 110	473	13 675	512	15 636	517	39 949
Exploration Permits	6	868	11	1 955	16	3 294	21	10 763
Limestone Exploration Permits	2	228	-	-	-	-	-	-
Peat								
Leases	30	4 152	36	5 030	36	5 029	38	13 179
Exploration Permits	3	877	2	465	1	269	-	-
TOTAL	11 380	1 452 952	11 760	1 540 074	12 453	1 791 199	12 953	1 929 208

*Area of Lease reduced.

Table 7

Mineral Dispositions Issued

each calendar year 1986 to 1989

	1986		1987		1988		1989	
	No.	Hectares	No.	Hectares	No.	Hectares	No.	Hectares
Mining								
Mining Claims	1 488	301 974	1 075	212 139	1 731	341 772	948	184 723
Permits	11	310 724	13	203 279	8	182 710	8	159 253
Explored Area Leases	-	-	-	-	-	-	-	375
Production Leases	-	-	-	-	-	-	-	-
Miscellaneous Mineral Leases	-	-	-	-	-	-	-	-
Special Permit	-	-	-	-	1	156 876	3	348 496
Quarrying								
Leases	50	1 629	46	1 231	56	2 433	35	4 050
Exploration Permits	7	868	5	1 533	10	2 848	7	2 863
Limestone Exploration Permits	-	-	-	-	-	-	-	-
Casual Permits	80	-	99	-	86	-	88	-
Permissions to Remove	613	-	629	-	628	-	595	-
Peat								
Leases	7	202	6	877	-	-	2	750
Exploration Permits	1	117	2	630	-	-	-	-

Table 8

Comparison of Manitoba Mineral Production and Value

1988 and 1989

	1988			1989*		
	Quantity (Imperial)	Value ($ 000)	Quantity (Metric)	Quantity (Imperial)	Value ($ 000)	Quantity (Metric)
Metals	(000 lb)		(000 kg)	(000 lb)		(000 kg)
Cadmium	165	1,435	75	262	1,950	119
Cobalt	1,001	8,582	454	780	6,957	354
Copper	117,004	167,483	53 072	109,709	170,163	49 763
Lead	1,008	463	457	4,123	1,948	1 870
Nickel	154,734	1,047,910	70 186	142,344	1,050,010	64 566
Selenium	84	1,049	38	60	530	27
Tantalum	40	1,695	18	79	3,328	36
Tellurium	13	317	6	13	238	6
Zinc	118,490	88,843	53 746	159,875	156,785	72 518
Other**	-	3,876	-	-	3,409	-
Precious Metals	(000 tr oz)		(000 g)	(000 tr oz)		(000 g)
Gold	144	77,301	4 469	135	60,717	4 187
Platinum Group	-	18,051	-	-	13,855	-
Silver	1,037	8,634	32 257	1,037	6,729	32 265
TOTAL METALS		1,425,639			1,476,619	
Industrial Minerals	(000 ton)		(000 tonne)	(000 ton)		(000 tonne)
Cement	450	42,419	408	463	44,037	420
Clay Products	-	2,203	-	-	2,068	-
Gypsum	272	3,148	247	117	1,510	106
Lime	-	8,275	-	-	8,970	-
Peat Moss	75	8,258	68	77	8,833	70
Quartz	-	-	-	-	-	-
Sand/Gravel	15,641	45,158	14 189	15,915	41,930	14 438
Stone	3,171	12,537	2 877	3,352	14,076	3 041
Sulphur	-	-	-	-	-	-
TOTAL INDUSTRIAL MINERALS		121,998			121,424	
Fuels	(000 bbl)		(000 m^3)	(000 bbl)		(000 m^3)
Petroleum	4,839	78,600	769	4,530	91,800	720
Nat. Gas By-Prod.	-	327	5	-	302	6
TOTAL FUELS		78,927			92,102	
GRAND TOTAL		**1,626,564**			**1,690,145**	

* *Estimated*

** *Includes bismuth, cesium, lithium*

Table 9

A Comparison of Value of Manitoba Metals, Industrial Minerals, Fuels and Total Mineral Production

From 1974 - 1989
(Calendar Year)

	($ 000)			
Year	Industrial Metals	Minerals	Fuels	Total
1974	413,530	45,556	27,169	486,255
1975	452,236	50,662	31,451	534,349
1976*	412,301	69,173	33,561	515,035
1977*	446,691	81,597	40,436	568,724
1978	338,123	83,696	45,937	467,756
1979	510,049	94,279	48,403	652,731
1980	664,809	100,814	54,968	820,591
1981*	478,637	115,189	64,251	658,076
1982*	353,150	96,606	101,065	550,822
1983	471,077	87,360	152,892	711,329
1984	540,922	106,602	169,296	816,820
1985	571,936	109,270	180,049	861,255
1986	534,970	133,082	95,840	763,892
1987	759,341	131,218	109,546	1,000,105
1988	1,425,639	121,998	78,927	1,626,564
1989*	1,476,619	121,424	92,102	1,690,145

* *Estimated*

Department Publications

Manitoba

GEOLOGICAL SERVICES REPORTS

Bedrock Geology Compilation Map 64F	Brochet-NTS 64F, 1:250 000 with marginal notes - Manitoba Energy and Mines, Geological Services
Bedrock Geology Compilation Map 64G	Big Sand Lake-NTS 64G, 1:250 000 with marginal notes - Manitoba Energy and Mines, Geological Services
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